THE RUBBER AGE

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THE RUBBER AGE

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VOL. IX SEPTEMBER 25, 1921 No. 12

The Influence of Certain Organic Accelerators on the Vulcanization of Rubber

By George Stafford Whitby and Osman James Walker

McGill University, Montreal, Canada

The experiments recorded in this paper refer to the influence of one per cent of (*a*) piperdine piperidyl-dithiocarbamate,[2] (*b*) hexamethylenetetramine, and (*c*) thiocarbanilide on the rate of vulcanization of a 90:10 rubber-sulphur mix and on the tensile properties, vulcanization coefficients, and aging qualities of the vulcanizates produced.

The rubber employed was pale Hevea crêpe. The stocks were sheeted out to a thickness of about three-sixteenths of an inch.[3] Vulcanization was done in an oil bath provided with suitable stirring arrangements.[4] The rubber was enclosed in a mold consisting of two steel plates, the upper plate being 0.5 in., and the lower one, which contained a cavity for the reception of the rubber slab, being 0.8 in. thick. The upper and lower parts of the mold were fastened together by means of ten bolts and nuts, a thin gasket of lead foil and a small amount of a litharge-glycerol paste being used to secure oil-tightness. In order to allow for the heating up of the mold, the oil was raised, before the mold was introduced, to a temperature 20 degrees above that at which it was desired to carry out the vulcanization.

After vulcanization, two dumb-bell test pieces were cut from each slab. One of these pieces was subjected to a tensile test after 3 days and the other 7 mo. later. For carrying out the tensile test, sliding steel wedge-shaped grips, short enough to allow of the ends of the test piece projecting beyond the grips, were employed.[5] The dead weight method was used for applying the load. The loading was done in a uniform manner, measurements of elongation being made, on gage lines,[6] at definite intervals. Stress-strain curves were plotted.

Nature of Results

The results obtained are shown in the accompanying tables and figures. The main series of vulcanizations on each mix was done at 141 degrees (40 lb. steam). In the case of the control mix and of the mixes containing hexamethylenetetramine and thiocarbanilide, respectively, vulcanizations were also carried out at a higher temperature, *viz.*, 148 degrees (50 lb. steam). In the case of the mix containing the piperidine salt, a second series of vulcanizations was carried out at a lower temperature, *viz.*, 130 degrees (25 lb. steam), the rate of vulcanization being too high to allow of accurate experiments at 148 degrees.

P_b represents the breaking stress in lb. per sq. in.; L^b the percentage length at break; $P_b \times L^b /100$, the tensile product divided by 100, *i.e.*, the breaking stress referred to the cross section at failure, on the assumption that the volume remains unchanged; L_{750}, the percentage length at a load of 750 lb. per sq. in.; V.C., the vulcanization coefficient.

Explanation of Stress Strain Curves

The stress-strain curves are shown only from a point corresponding to a length of about 400 per cent, as the later portion of the curve is the portion which can be determined most accurately and is all that is necessary in order to obtain the desired information as to relative rate of curve, breaking points, etc. The curves referring to tensile tests made 3 days after vulcanization are drawn with unbroken lines; those referring to tensile tests made after aging 7 mo. with broken lines. L_{750} forms a convenient reference point, the figures corresponding to which enable the relative positions of curves corresponding to different periods of vulcanization and the shifting of the curves on aging to be read easily.

TABLE I.—CONTROL (90 PARTS RUBBER; 10 PARTS SULPHUR).

	Time, Min.	P_b	L_b	$\frac{P_b \times L_b}{100}$	L_{750}	V. C.		P_b	L_b	$\frac{P_b \times L_b}{100}$	L_{750}	V.C.
						At 141°				After Aging 7 mos.		
A	120	875	970	8487	951	2.27	A′	1040	930	9672	888	2.56
B	150	1160	930	10788	866	3.27	B′	1285	880	11335	813	3.59
C	180	1290	875	11288	800	4.31	C′	1280	827	10585	754	4.26
D	210	Brittle (broke at 150 lb./sq. in.)				4.97						
						At 148°						
E	75	930	950	8835	913	2.97	E′	1070	895	9576	836	3.23
F	90	1251	880	11008	802	4.41						

TABLE II.—CONTROL + 1 PER CENT PIPERIDINE PIPERIDYL-DITHIOCARBAMATE)

	Min. Time,	P	L_b	$\frac{P_b \times L_b}{100}$	L_{750}	V. C.		P_b	L_b	$\frac{P_b \times L_b}{100}$	L_{750}	V.C.
						At 141°				After Aging 7 mos.		
G	10	1125	913	10271	848	1.88	G′	1500	878	13170	779	2.03
H	15	1220	903	11017	827	2.09	H′	1457	853	12428	745	2.43
I	17.5	1315	870	11440	795	2.70	I′	1420	815	11570	730	2.91
J	22.5	1525	836	12760	744	3.65	J′	1803	805	14510	683	4.00
K	25	1870	845	15801	723	3.72	K′	1841	785	14452	661	4.15
L	30	1826	824	15047	702	4.40	L′	1738	751	13053	634	4.73
						At 130°						
M	45	1291	902	11644	830	2.60	M′	1302	872	11353	798	2.89
N	60	1657	874	14481	776	3.00	N′	1672	836	13978	740	3.55
O	75	1687	820	13834	723	3.73	O′	1769	804	14224	690	4.33
P	90	1654	800	13232	706	4.59	P′	2040	803	16381	666	5.10

[1] Presented before the Rubber Division at the 61st Meeting of the American Chemical Society, Rochester, N. Y., April 26 to 29, 1921. Courtesy Journal of Industrial and Engineering Chemistry.

[2] In the preparation of this compound the piperidine can conveniently be applied in the form of an aqueous solution.

[3] The authors are much indebted to Mr. W. B. Wiegand for making the mixings.

[4] The oil used was a light engine oil known in the Standard Oil system as Zone Oil.

[5] Cf. G. Stafford Whitby, "Plantation Rubber and Testing of Rubber," 1920, 261, Longmans.

[6] In order to obtain these lines fine they were drawn while the rubber was stretched to twice its length. After his stretching the rubber was allowed to rest for some time before being tested.

TABLE III.—(CONTROL + 1 PER CENT. HEXAMETHYLENETETRAMINE)

	Time, Min.	P_b	L_b	$\frac{P_b \times L_b}{100}$	L_{730}	V. C.		After Aging 7 mos. P_b	L_b	$\frac{P_b \times L_b}{100}$	L_{730}	V.C.
					At 141°							
Q	30	745	940	7000	940	3.64						
R	60	1148	959	11010	910	4.76						
S	75	1070	928	9929	884	5.28	S′	1292	880	11370	808	
T	90	1312	935	12267	873	5.41	T′	1290	880	11352	808	
U	105	1330	925	12302	862	5.69	U′	1362	865	11781	786	
V	120	1336	910	12158	844	5.79	V′	1440	867	12485	778	
					At 148°							
W	30	1087	970	10544	916	4.71						
X	45	1523	960	14621	880	5.32	X′	1500	880	13200	790	
Y	60	1413	900	12717	823	6.07	X′	1350	835	11272	749	

TABLE IV.—(CONTROL + 1 PER CENT. THICOARBANILIDE

	Time, Min.	P_b	L_b	$\frac{P_b \times L_b}{100}$	L_{730}	V. C.		After Aging 7 mos. P_b	L_b	$\frac{P_b \times L_b}{100}$	L_{730}
					At 141°						
I	120	680	920	6256	(930)	3.08	I′	686	800	5488	(813)
II	150	1050	937	9839	891	3.98	II′	1243	856	10640	780
III	180	1274	910	11593	819	4.87	III′	1390	847	11774	754
IV	195	1270	868	11024	791	5.21	IV′	1126	890	9098	737
V	210	Brittle (broke at lb./sq. in.)			285	6.02	V′	Brittle broke at lb./sq. in.)			228
					At 148°						
VI	75	940	935	8780	901	3.41	VI′	1119	878	9824	821
VII	90	1118	890	9950	834	4.53	VII′	1485	860	12740	760
VIII	105	1270	850	10790	773	5.21	VIII′	1272	770	9563	700
IX	120					5.58	IX′	Brittle (broke at lb./sq. in.)			240

Discussion of Results

Control—The optimum cure at 141 degrees is obtained at about 180. min. The maximal tensile strength shown by the rubber is lower than that usually shown in tests with first latex rubber, probably owing, in part at least, to the circumstance that the cross section of the test pieces used (½ x 3/16 in.) was greater than usual. On aging the vulcanizates, the breaking points, the position of the stress-strain curves, and the magnitude of the vulcanization coefficients alter in a normal manner. The downward movement of the stress-strain curve on aging appears to be noticeably slower than that found by de Vries and Hellendoorn in aging experiments at tropical temperatures with rubber samples cured, with 7.5 per cent of sulphur, at 148 degrees.

Comparing vulcanization at 148 degrees with vulcanization at 141 degrees, it may be noticed that the curve for F (90 min. at 148 degrees) is almost coincident with that for C (180 min. at 141 degrees), showing that an increase in temperature of 7 degrees roughly doubles the rate of vulcanization.

Piperdine Piperidyl-Dithiocarbamate. Rate of Cure—The optimum period of cure at 141 degrees may be considered

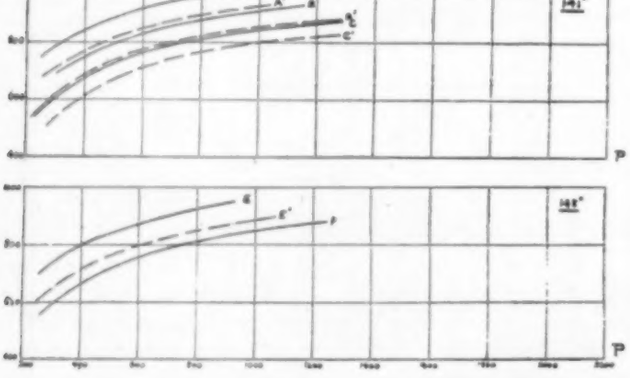


FIG. 1. VULCANIZATION OF CONTROL (90% RUBBER, 10% SULPHUR) AT 141° AND AT 148°

as being 25 min. Hence the "acceleration factor"[1] of the piperdine salt may be considered as 180/25, *i.e.*, 7. Comparison of the vulcanization results at 130 degrees with the results for the control at 148 degrees shows that 1 per cent of the piperdine salt leads to vulcanization in a shorter period of time at 130 degrees (25 lb. steam) than in its absence is required at 148 degrees (50 lb. steam). (The optimum time at 130 degrees may be taken as 75 min.)

Tensil Properties—The accelerator has an important effect in increasing the tenacity developed by the rubber on vulcanization, the maximal breaking stress developed (1870 lb. per sq. in.) being 45 per cent greater than that developed by the control (1270 lb. per sq. in.). The accelerator, however, reduces the extensibility. It has the further effect of bringing the optimum stress-strain curve into a lower position on the paper, L_{730} being 723 in the presence of the accelerator and 800 in its absence. These noteworthy effects of the accelerator, leading to a lower but longer stress-strain curve, may readily be seen by comparing Curve K, Fig. 2, with Curve C, Fig. 1.

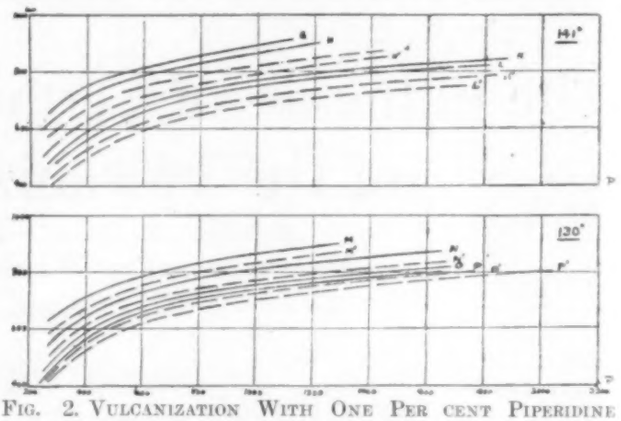


FIG. 2. VULCANIZATION WITH ONE PER CENT PIPERIDINE PIPERIDYL-DITHIOCARBAMATE AT 141° AND AT 130°

Coefficient of Vulcanization—The vulcanization coefficient at the optimum cure is somewhat reduced by the accelerator (3.72:4.31).

Aging—The aging qualities of vulcanizates prepared with the aid of the accelerator appear to be normal. They do not differ in any essential respect from those of the control or from those of rubber-sulphur vulcanizates in general as studied by deVries and Hellendoorn. There is no evidence of the use of this vigorous accelerator leading to rapid deterioration. The curves move in a normal manner, and, if anything, at a slower rate than in the case of the control. In all cases L_b falls; P_b shows no serious falling off, and, in cures short of the optimum, it rises.

It is of interest to compare the effects of piperdine piperidyl-dithiocarbamate with those of other powerful accelerators for which data have been published. The dithiocarbamate prepared from piperdine, when tested in a mix containing rubber and sulphur only, is by no means as powerful as Cranor's results show the corresponding compound prepared from diethylamine to be when tested in a mix containing zinc oxide in addition to rubber and sulphur. Quite possibly, however, the piperdine compound would prove to be similar to the dimethylamine compound in its degree of activity if it were tested in the presence of zinc oxide. The results obtained with the piperdine compound in the absence of zinc oxide agree with the results obtained by Cranor with the dimethylamine compound in the presence of zinc oxide in the following respects: In both cases the accelerator raises the maximal breaking stress attainable, and this maximum corresponds to a lower stress-strain curve. They differ in the following respects: (1) According to Cranor's data, the dimethylamine compound does not reduce the ultimate elongation; (2) whereas the vulcanization coefficient at the optimum cure is very greatly reduced by the presence of the dimethylamine compound, it is reduced only to a comparatively small extent by the piperdine compound. This last difference is not unexpected, in view of the much greater degree of activity of the former compound when used in the presence of zinc oxide.

The piperdine salt has almost exactly the same degree of activity as aldehyde ammonia—an accelerator which has been

[1] *Arch. Rubbercultuur*, 4, 1920, 429.
[2] Compare Twiss and Brazier, *J. Soc. Chem. Ind.*, 39, 1920, 125.
[3] *J. Soc. Chem. Ind.*, 39 (1920), 287*t*; Cf. also Twiss andBrazier, *Ibid.*, 131*t*.

extensively tested in a simple rubber-sulphur mix by Twiss and Brazier. These authors give the "acceleration factor" of aldehyde ammonia as 7.5. A comparison of the effects of the piperdine salt and of aldehyde ammonia shows the following:

1—The effect on the vulcanization coefficient at the optimum cure is of the same order, a reduction, but not a very great one, being noticeable.

2—The effect on the position of the stress-strain curve and on the ultimate elongation at the optimum cure is similar, the curve lying lower and the L_b being smaller than with the

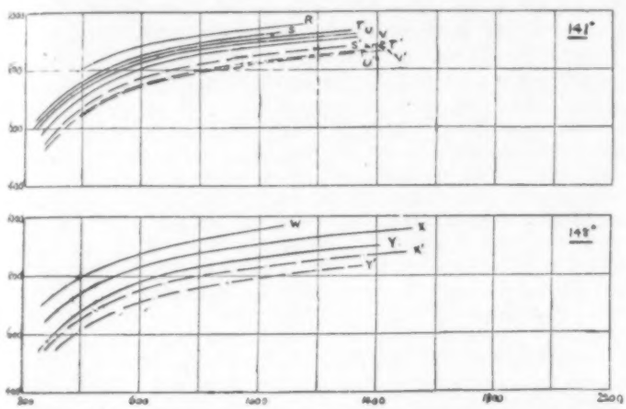


FIG. 3. VULCANIZATION WITH ONE PER CENT HEXAMETHYLENETETRAMINE AT 141° AND AT 148°

controls, although the effect of aldehyde ammonia in these respects is not quite so marked as that of the piperdine salt.

3—The piperdine salt appears to have a marked advantage over aldehyde ammonia in regard to the tensile strength of the vulcanizates; for, whereas the former greatly enhances the maximal tensile strength, the latter increases it only a little.

Hexamethylenetetramine. Rate of Cure—In these experiments hexamethylenetetramine appears as only a very mild accelerator; the rate of cure at 141 degrees being only a little more than 1.5 times the rate shown by the control (say, 180: 105-120).

Tensile Properties—The ultimate elongation (L_b) shown by the rubber at the optimum cure is increased. The curve corresponding to the optimum cure is higher in the presence than in the absence of the accelerator by a length of about 50 per cent. The most striking effect of the accelerator on the tensile properties is to be seen in the slowness with which the tensile properties of the vulcanizates change over a rather wide range of curing intervals. The tensile strength, the ultimate elongation, and, as may be seen by a glance at Fig. 3 ,the position of the stress-strain curve, change only remarkably slowly. Whereas, in the case of the control, a reduction of one-third in the time of cure below the optimum (from 180 to 120 min.) shifts the curve (L_{300}) by 150 per cent, a similar reduction (from 120 to 90 min.) in the case of the mix containing hexamethylenetetramine shifts the curve only 29 per cent. Hence it would appear that the addition of hexamethylenetetramine to a pure gum stock has the effect of enabling the period of vulcanization to be varied over a comparatively wide range without much change occurring in the tensile properties of the resulting vulcanizates.

The maximal tensile strength developed is slightly, but not, as with piperdine, piperidyl-dithiocarbamate, strikingly, greater than that developed by the control.

These conclusions as to the effect of hexamethylenetetramine on the tensile properties of rubber-sulphur vulcanizates are in general agreement with conclusions indicated by data published by Twiss and Howson[1] for the same accelerator. These authors, too, find the tensile strength maximum to be flat. They also find the position of the stress-strain curve (indicated by the length at 0.5 kg. per sq. mm.) to change more slowly in the presence than in the absence of the accelerator; although the difference is not so marked as in the present experiments. The results of Twiss and Howson show hexamethylenetetramine to be considerably more active in the presence of zinc oxide than in its absence, 1 per cent in the presence of zinc oxide having an acceleration factor of rather more than 2. They also show that the flatness which is characteristic of the tensile strength maximum when the accelerator is used in the absence of zinc oxide is no longer to be seen when zinc oxide accompanies the accelerator.

Vulcanization Coefficient—Although hexamethylenetetramine accelerates the rate at which the optimum cure (as judged by tensile properties) is reached, it increases the amount of sulphur in combination at this cure. Whether this effect is due to the production of an acetone-insoluble material from the accelerator and sulphur cannot be said.

Aging—The vulcanizates prepared with hexamethylenetetramine behave normally during the aging period.

Comparison of the Effects of Piperdine Piperidyl-dithiocarbamate and Hexamethylenetetramine—The effects of these accelerators present a noteworthy contrast, which shows clearly how different properties may be conferred upon rubber by the use of different accelerators.

1—Whereas the piperdine salt diminishes the extensibility of the rubber, hexamethlenetetramine increases it. Further, the latter accelerator makes the rubber comparatively insensitive to changes in the time of vulcanization from the time giving the optimum cure, whereas the former accelerator has no such influence in altering the sensitiveness of the rubber to change in the vulcanization period.

2—Whereas the piperdine salt has a marked effect in increasing the tensile strength developed, hexamethylenetetramine has little or no such favorable effect.

3—Whereas use of the piperdine salt results in a reduction in the vulcanization coefficient at the optimum cure, hexamethyenetretramine results in an increase.

Thiocarbanilide—A comparison of the results for the mix containing thiocarbanilide with those for the control shows that, both for vulcanizations at 141 degrees and for those at 148 degrees, the former results are substantially similar to the latter, as regards tensile properties. Hence, with respect to tensile properties, thiocarbanilide is without accelerating effect. The presence of thiocarbanilide in the pure gum stock in question leads, however, to some increase in the combined sulphur, the vulcanization coefficient at the 180-min. cure being raised from 4.31 to 4.87. This is in accord with results

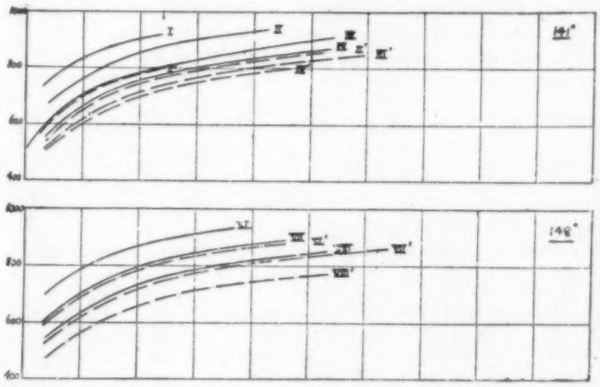


FIG. 4.—VULCANIZATION WITH ONE PER CENT THIOCARBANILIDE AT 141° AND AT 148°

of Kratz, Flower and Shapiro.[1] It is possible that the apparent increase in the vulcanization coefficient is due to the formation of acetone-insoluble products as a result of interaction between sulphur, thiocarbanilide or its decomposition products, and, possibly, caoutchouc.

The thiocarbanilide is without effect on aging.

(*Continued on page 460*)

[1]Cf. also Cranor, *Loc. cit.* Cranor's results with hexamethlene-tetramine also show the accelerator to be more active in the presence of zinc oxide than was found by Twiss and Howson or in the present experiments to be in the absence of the oxide. They also indicate that in the presence of zinc oxide the accelerator leads to certain irregularities in the manner in which the stress strain curve shifts on continued vulcanization. These irregularities have been examined more closely by Twiss and Howson. (*Loc. cit.*)

ABSTRACTS

Technical — General — Commercial

Using Vulcanized Rubber Waste

A process is described in United States Patent No. 1,384,773 which is concerned with the utilization of vulcanized waste rubber which contains cotton or other fabric, such as, canvas or cord parts of automobile tires, rubber belts, etc.

The process in question converts the rubber into hard rubber, whereat it is utilized with or without the separation of the fabric. In the latter case, the rubber is ground and the fibers are separated from the rubber dust by sifting, air flotation or other similar means. To do this, about 32 per cent additional sulphur must be added, depending on the amount of sulphur that is present originally. The theory of the conversion of the rubber into hard rubber is that the sulphur will enter into the rubber while vulcanization takes place and the diffusion of the same into the rubber will be aided by the capillary action of the fabric which acts as a wick in drawing the melted sulphur into intimate contact with the surrounding rubber.

Rubber as a Lubricant

Robert McLeod of New Zealand has been granted a patent (see United States Patent No. 1,387,437) in which there is disclosed a novel use for rubber. On superheated steam lines there has always been difficulty experienced in keeping the valves and cocks tight. The plugs in the cocks are generally lubricated with fat or other grease, but the steam destroys the same rather rapidly, with the result that cocks leak.

A mixture of rubber and tallow or any other suitable grease or oil gives very good results. The composition consists of four parts of rubber to one part of tallow. The rubber is first cut into small pieces and then boiled until it becomes liquid. Then the tallow is added and the whole is stirred very vigorously until a uniform mixture is obtained. This has a jelly-like consistency and is used as such by smearing on the surface that is to be lubricated. It appears that the tallow has a solvent action on the rubber when in an intimate mixture with it and as the result of the lasting nature of this property, the composition remains soft for a long time even under the most severe conditions.

Treating Vulcanized Articles

Canadian Patent No. 195,564 is concerned with a process of neutralizing the sulphurous and sulphuric acids that are formed by oxidation of the sulphur in the vulcanized rubber. These acids injure the fibers which may be incorporated with the rubber. The treatment consists in subjecting the vulcanized articles while they are still hot to the action of ammonia under pressure in a closed vessel. Other substances than ammonia may be used, but they must be of such a nature that they do not injure the rubber while neutralizing the acidity.

Ebonite and Vulcanite Substitutes

When a mixture of rubber and sulphur is heated in a masticator for four hours at 270 to 75 degrees and stearine pitch, shellac, lampblack, gelatine and peat or other vegetable fibers are added, then a product is obtained according to British Patent No. 164,392, which may be used as a substitute for ebonite and vulcanite. The mass is heated to such a point where it may be moulded, pressed or cast into any desirable form.

Substitute for Rubber and Gutta-Percha

British Patent No. 165,007 is concerned with a composition product which may be used as a substitute for rubber or gutta-percha. The principal constituent of the composition is seaweed particularly the type which is known botanically as Laminariaceae Naiadaceae of Fucaceae. The weed is first heated with a dilute aqueous solution of an alkali below the boiling point with continual stirring. The agitation is continued until a thick jelly is obtained. A similar jelly is made by heating the skivings of untanned hides with an aqueous caustic soda solution. This jelly is subsequently treated with tanning agents such as pyrogallol or catechol materials or with chromium salts and at the end about 1 per cent of lime is added. The two jellies are then mixed and maintained at a temperature of 120 degrees F with constant stirring. Any desired filling and coloring material can be added in the meantime until the mixture is dry. The dry mass is then mixed with a solution of an elastic binding agent such as rubber, and with a vulcanizing agent. It is stirred until an homogeneous dough is obtained. The raw product may be applied to the manufacture of floor coverings, leather substitutes either in the unvulcanized or vulcanized state.

Vulcanizing Press

United States Patent No. 1,386,603 is concerned with an improved vulcanizing press which is used in the manufacture of tires. In this press the air pipe, which in the ordinary form of press is carried by the ram which traverses the vulcanizing chamber, is carried through the removable cover instead of being connected with a flexible hose or other means with some portion of the side of the chamber. By avoiding this arrangement which is found in all the common types of presses, the use of certain connecting fittings is permitted and the leakage of air into the vulcanizing chamber is prevented and the subsequent deformation of the tires.

An Apparatus for Tubing, Cooling and Cutting Tire Treads

An American Patent, U. S. Patent No. 1,382,207, which has been assigned to the Firestone Tire & Rubber Company, is concerned with improvements to the process of making articles of rubber, especially the treads of rubber tires, such as are capable of being manufactured by extruding or tubing the rubber by means of a particular form of apparatus.

In the old process of making tire treads, the tread has been cut to the length that was thought proper, after an allowance had been left for shrinkage during the cooling and aging. Then they were stacked and allowed to age. It was impossible to cut a tread of the exact length by this process, in as much as the shrinkage is variable. It also involved the keeping of a large stock of treads on hand and made it necessary to have a large floor space within which to accomplish this manufacture.

In the new process the treads are cooled right after they leave the machine, so that the shrinkage takes place at once. Then the tread is cut the desired length to fit the tire exactly. The amount of scrap rubber obtained is considerably reduced.

The apparatus consists of a tubing machine through which the rubber is extruded through a heated die in the form of the desired cross-section. The endless strip of rubber passes through a cooling tank filled with water. Where the tread emerges from the water, there is arranged a cutting device which severs the strip of rubber into the proper lengths, which are then used at once on the tire.

Rubber Division Meets in New York

Fifth Meeting of Division Held in Connection with the Sixty-second Meeting of American Chemical Society, at Columbia University, September 7 and 8—Interesting Papers and Elections Feature Gathering

Approximately 150 members of the Rubber Division of the American Chemical Society attended the fifth meeting of the division which was held in connection with the sixty-second meeting of the society, in New York on September 7 and 8. Officers were elected for the ensuing year, important business was transacted and a number of exceedingly interesting papers were read.

The various divisions of the American Chemical Society met at Columbia University while the Rubber Division in particular held its sessions in the School of Mines of the University. The one regret on the part of those in attendance was that they were limited by time. With one exception the addresses called for a series of interesting discussions and these, although instructive to a degree, had to be limited with respect to duration.

The general trend of discussion in the Rubber Division was along the line of improving plantation rubber, the nature of vulcanization, improving the wear of tires and increasing the aging qualities.

Dr. de Vries, coming from the Central Rubber Plantations in Java, gave considerable data on the preparation and testing of plantation rubber and asked cooperative research between the plantation men and factory chemists.

The analytical committee had not been able to arrive at a standard method of analysis. The accelerator committee reported the analysis of about forty trade name accelerators. The physical testing committee reported tentative methods for testing the degree of vulcanization and proper cure of a rubber compound.

Election of Officers

Officers for the following year were elected as follows: chairman, C. W. Bedford; vice-chairman, H. E. Simmons; secretary A. H. Smith; executive committee: W. B. Wiegand, W. W. Evans, J. B. Tuttle, D. F. Cranor, F. G. Breyer.

There was much sentiment expressed for cooperation in research between the different manufacturers and also between th manufacturers and producers As a result a resolution was addressed to the Rubber Association as follows: "It is a recognized fact that there are certain fundamental principles of general interest to the rubber industry as a whole which no single company should be expected to .... develop.

"Therefore it is the sense of the Rubber Division of the American Chemical Society, numbering approximately 200 members from all the leading companies, both large and small, ... that a cooperative research laboratory be established under the auspices of the Rubber Association of America for furthering the investigation of such fundamental problems."

Following are abstracts of papers read at the meeting:

Microscopy of Rubber Fillers

A preliminary paper by Irene C. Diner on the determination of rubber fillers, which is a part of the work on the microscopy of rubber initiated at New York University. This paper covered the qualitative identification. It introduces the use of petrographic methods into rubber technology.

The principal rubber fillers, namely: barytes, whiting, zinc, oxide, lithopone, litharge, red lead, antimony sulphide, iron oxide and gas black. A large chart is given showing the characteristics which differentiate the substances microscopially.

Among the properties shown are size, color, shape, crystal structure, impurities and optical properties.

These qualities form a basis of a positive method of identification of the fillers based upon seventeen different measurable physical properties. A further paper is under preparation giving methods of estimating the percentage of the fillers so determined.

It is hoped that this method will in time supercede the present lengthy and cumbersome qualitative and quantitative analysis.

Besides being shorter it is more exact since it gives the exact state in which the filler is present rather than merely the amount of each element with a good guess as to their association, for example; whether the substance be present pure or impure, hydrated or anydrous, etc.

Mineral Rubber

The purpose of this paper by C. O. North was to bring out the desirable and undesirable properties of mineral rubber in order that mineral rubber makers could appreciate more fully how their product is employed.

Changes in stress strain relations, hysteresis losses, permanent set, energy of resilience and abrasion with increase in mineral rubber ratio to rubber were shown.

Mineral rubber is essentially a plastic material. When a stock containing it is stretched, it flows with the rubber. On release it flows back with the rubber. The principal evidence of its presence is a slowing up or logging of the return.

The Tetra-hydrophenyl Derivative of Rubber and its Tetra-methyl Ether

This paper by Harry Fisher and Harold Gray was exceptionally interesting. The tetra-phenoxy derivative of rubber described by Weber (ber. *33*, 791) was shown to be the tetra-hydroxphenyl derivative not only by the method of formation, and by its solubility in aqueous *NaOH*, but especially by the fact that it can very readily be methylated to the corresponding tetramethoxyphenyl derivative. The reaction for preparing the hydroxyphenyl compound from rubber tetrabromide and phenol is like a Friedel-Crafts' reaction, being speeded up by the use of anhydrous aluminum chloride, zinc chloride, etc. Other halogen derivatives of rubber such as the dihydrochloride also react with phenol.

The Determination of True Free Sulphur and True Coefficient of Vulcanization in Vulcanized Rubber - II -

This paper by W. J. Kelly demonstrated the application of the method devised for pure gum stocks (J. Ind. Eng. Ch. 12,875, 1920) to compounded stocks. Free sulphur determined by the "saturated alcohol" method. For combined sulphur the sample is extracted with ale. *KOH* and ether *HCl*. The latter removing any sulphide as *H2S* and dissolving accelerators which form water on ether soluble hydrochlorides. In this way considerable sulphur is removed in addition to that extracted by acetone and which had previously been considered as combined with the rubber. In some cases an additional extraction with water is necessary but the details of this remains to be worked out.

Corrected Stress Strain Curves for Rubber

In this address by J. W. Shields an improved method is explained for drawing stress strain curves for rubber which takes into account the decrease in cross section of the specimen. Such curves do not have the *S* shape which is characteristic of uncorrected curves. The corrected curves shows the modulus of rubber to be least at the smallest elongation and to increase gradually as the specimen is stretched. The method for determining the true modulus of unstressed rubber is illustrated. The equations for this curve is developed and the values of the equation constants given for several stocks.

The Determination of the Particle Size of Pigments

In this paper W. W. Vogt showed that by a turbibimetric method it is possible to determine the capacity of a pigment to extinguish direct light rays. This capacity, called obscuring

power, is a direct function of the average particle size of the pigment. The values of obscuring power are shown to be consistent with particle size as determined microscopically and furthermore to be in close accord with the practical compounding value of the pigment. Hence, by the determination of obscuring power of an unknown pigment it is possible to predict what its practical compounding value will be in relation to known pigments.

Recent Developments in the Art of Rubber Microsectioning

This paper was by Henry Green and showed a method for making microsections of rubber has been developed which is free from the various inconveniences associated with the method heretofore employed of freezing the sample with CO_2 and liquid air.

The elasticity is destroyed and sufficient rigidity acquired by treating the sample with dilute *SCl* solution.

Sections are obtained ½ mm. x 4 mm. in area, which under a magnification of 1500 diameters appears, in round numbers, to be a strip 3 feet wide and 20 feet long. This is sufficient to show all the characteristics of the sample. The sections can be made exceedingly thin, beautifully transparent and of uniform thickness.

Piperidine-Piperidyl-Dithiocarbamate as a Rubber Accelerator in the Presence of Zinc Oxide

G. S. Whitby and A. H. Smith showed one part of piperdine-piperidyl-dithiocarbamate in a 90 rubber 10 s., 10 zinc oxide mix cuts the time of vulcanization at 141 degrees C from three hours to less than one minute. At 131 degrees C. it cuts the time of vulcanization from seven hours to one minute. It is fully vulcanized in three to four minutes at 115 degrees. When only two parts of sulphur are used the time of vulcanization is one minute at 141 degrees, or two minutes at 131 degrees, or ten minutes at 115 degrees. Stress-strain data was given.

Reactions of Accelerators During Vulcanization IV. (Mechanism of the Action of Zinc Compounds)

C. W. Bedford and L. B. Sebrell were the authors of this interesting paper. Zinc sulphydrate vulcanizes rubber in the presence of sulphur at ordinary temperatures. Zinc persulphides are stable compounds and vulcanize rubber in heat cures far more rapidly than ordinary sulphur. Zinc salts of organic accelerators form polysulphides without decomposition into zinc sulphide and disulphides. Disulphides are changed to mercaptans by hydrogen sulphide and in the presence of zinc oxide—they form zinc salts. (An answer to Bruni India Rubber J 62 (1921) 63.)

The Action of Volatile Organic Solvents and Vulcanizing Agents on Organic Compounding Materials and Resinous Gums

Frederick Dannerth was the author of this investigation the purpose of which was to obtain fundamental data for the industries which use plastic masses. The amount of matter soluble in certain liquids at stated temperatures has been studied. It was also noted: the amount of a given solvent which will mix with any other given solvent at a given temperature: the swelling action of certain solvents on stated organic materials; the action of certain vulcanizing agents on pitches and oils as well as their action on chicle, balata, gutta-percha, and jelutong. The influence of the product has been studied, first using only organic compounding material and secondly using only the resinous gums.

Purifying Rubber and Gutta Percha

C. H. Gray of London, England, has been granted United States Patent No. 1,386,055 on a process of purifying raw india rubber or gutta-percha to remove various mineral and vegetable constituents such as sand, fiber, etc. The process consists in subjecting the rubber in the form of thin sheets or crumbs to the action of hydrofluoric acid in the presence of water. The preferred method of treatment is to first convert the rubber into the form of dough.

In the first place the rubber is washed as thoroughly as possible to remove as much as possible of the mineral matter and other extraneous substances. Then it is passed through pressure rollers so that is is flattened out into thin sheets or films. These are then immersed in a solution of hydrofluoric acid, whose strength varies from 8 to 30 per-cent, according to the size of the particles of sand, the permeability of the rubber to the liquid and the time of immersion. A preliminary test will determine the proper relation of these factors. It is not possible to state exactly the proper proportions of the acid and rubber because of the variance in the nature of the different raw rubbers and gutta-percha. After treatment the sheets of rubber are removed from the acid solution and washed with water or dilute alkali if necessary.

In another method after the raw rubber is washed it is worked into the form of a plastic dough by rolling and kneading while it is being subjected to the action of the hydrofluoric acid. About 100 lbs. of the raw rubber or gutta percha at a time may be treated in a kneading machine with a 15 per cent acid solution at a temperature of 100 degress C for about 2 hours. At the end of that time all the mineral matter had been removed. When the raw rubber or the gutta-percha contains moisture it may be treated with hydrofluoric acid in the gaseous form. This is generally done at atmospheric temperature and pressure and takes about three hours.

The process may be applied to waste vulcanized rubber as well. The rubber is first ground up into crumbs and treated in lots of two or three pounds each, moistened with 5 per cent water, with gaseous hydrofluoric acid at atmospheric temperature and pressure for about three hours.

Influence of Certain Organic Accelerators on Vulcanization of Rubber

(*Continued from page 457*)

Summary

1—In a simple rubber-sulphur mix piperdine piperidyl-dithiocarbamate is a comparatively powerful, and hexamethyl-enetetramine a weak, accelerator, one per cent reducing the time of optimum cure to one-seventh and to two-thirds respectively, of the time required in the absence of the accelerator.

2—These two accelerators present a notable contrast in their effects on the tensile properties of the rubber. The piperdine salt greatly enhances the tensile strength which can be developed; it leads to a smaller ultimate elongation and a lower position of the stress-strain curve (strains as ordinates) at the optimum cure. Hexamethylenetetramine enhances the tensile strength only a little; it leads to a greater ultimate elongation and a higher position of the stress-strain curve at the optimum cure; it also has the effect of causing the tensile properties to change with exceptional slowness with change in the length of the vulcanization period.

3—The piperdine salt reduces somewhat, whereas hexamethylenetetramine increases somewhat, the coefficient of vulcanization at the optimum cure.

4—In the absence of zinc oxide, thiocarbanilide is without accelerating effect on the vulcanization, considered with respect to tensile properties. It increases somewhat the vulcanization coefficient at the optimum cure.

5—In an aging test of 7 mo.' duration, pure gum vulcanizates prepared with the aid of the accelerators in question are found to age normally.

Addendum. Vulcanization tests which Mr. Arnold H. Smith has kindly carried out with material supplied by the authors show that the presence of zinc oxide increases the accelerating activity of piperdine piperidyl-dithiocarbamate very greatly over that found, in the absence of zinc oxide, in the experiments recorded above. In a mixture similar to that used above, but containing in addition 10 per cent of zinc oxide, the acceleration factor for 1 per cent of the piperdine compound is in the neighborhood of 200; 1 mins. heating at 141 degrees giving an over-cure, and a good cure being obtainable by 4 mins. heating at a temperature as low as 105 degrees (3 lb. steam).

National Exposition of Chemical Industries

Eighth Coast Artillery Armory, New York, the Scene of the Seventh Annual Exposition Held During Week of September 12. Over 400 Firms Display Products. Interesting Technical Program a Feature.

One of the greatest displays of chemicals and chemical apparatus ever witnessed in this country took place during the week of September 12 when the seventh National Exposition of Chemical Industries held its annual exhibit in New York City. The armory of the Eighth Coast Artillery, N.G.N.Y., located at Jerome avenue and Kingsbridge Highway, the Bronx, was the scene of the exposition and it would have been difficult to have obtained a better setting for the various exhibits which were over 400 in number.

Excellent Arrangements

The entire drill floor of the armory was given over to the exhibits. Inasmuch as this is said to be the largest edifice of its kind in the United States the arrangement of all displays were adequately taken care of on the one floor. This arrangement in itself was a boon to the visitors who were not obliged to climb stairs or become confused in locating the various exhibits. It is estimated that the attendance was of a record-breaking nature. The fact that the armory was somewhat removed from the center of the city was responsible for the fact that the interest of the visitors in the various displays was greater than in former years for only those who were really interested in the exhibition made the trip. That there were a number of these is attested to by the fact that daily attendances were in the neighborhood of 20,000. Every effort was made to have the displays of interest to the visitors. Many of the firms had machines installed in their booths and in a great number of instances these were in operation.

During the week an interesting technical program was held in connection with the exposition. Coming as it did the week after the meeting of the American Chemical Society and but shortly after the meeting of the Society of Chemical Industry, in Canada, there was great interest manifested in this feature. This technical program continued throughout the week and was divided into afternoon and evening sessions. The program was further enlivened by the introduction of motion pictures. Of particular interest to the rubber industry was the afternoon session held on Wednesday, September 14, during the course of which an evaporating and drying symposium was held.

Among the exhibits of interest to the rubber industry were the following:

The Exhibits

The Foxboro Company, Inc., Foxboro, Mass., exhibited indicating and recording gauges for pressure and vacuum, test gauges, marine clocks, indicating and recording thermometers. A new liquid level gauge in operation was particularly featured as was an automatic temperature recorder-controller, also in operation. W. W. Patrick, L. H. DuPaul, W. E. Booth and C. C. Fuller were in charge.

C. J. Tagliabue Mfg. Co., Brooklyn, N. Y., exhibited a time, temperature and condensation controller, a time controller used in connection with a perfect controller, a new time, temperature and humidity control and a P. and W. liquid level control for continuous evaporation processes were also featured. T. Dougherty, F. T. Craig and J. Dohrig were in attendance at the booth.

National Aniline & Chemical Co.

The National Aniline & Chemical Company featured a display of intermediates and dyes together with an assortment of textiles and other articles in which the various National aniline colors are used. The exhibit was in charge of Dr. L. J. Matos assisted by a number of experts and salesmen including S. W. Wood, A. E. Wood, F. J. Allen and E. B. Nickerson of the Philadelphia office. M. W. Moorhouse and W. W. Rouse of the Boston office and W. H. Willard of the Charlotte office. The National Aniline & Chemical Company display was located in the exact center of the armory and occupied one corner at the intersection of the two main passages. The other three corners were occupied by the Barrett Company, the General Chemical Company and the Solvay Process Company and Semet-Solvay companies with which it is associated. These booths were without doubt among the most striking at the exhibit and presented an especially attractive appearance. They were Egyptian in design and consisted of attractive backgrounds decorated with Egyptian hieroglyphics in front of which were Egyptian pylons or pillars also decorated in the same manner. Both backgrounds and pillars were buff in color while the various figures appearing upon them were colored after the fashion of descriptions and pictures found in old Egyptian excavations while over the displays were spread bright yellow canopies.

New Jersey Zinc Co.

Besides exhibiting the entire line of zinc products it manufactures, the New Jersey Zinc Company featured rolled zinc for building construction work. Zinc leaders, eaves-troughs, Spanish tiles, flashings, valleys, fittings, etc., installed on an improvised portion of roof were displayed. Specimens of these articles in various shapes and styles were shown. All were made from Horse Head rolled zinc.

Other zinc products manufactured and sold by the New Jersey Zinc Company and the Mineral Point Zinc Company to be displayed, and their uses by numerous industries exploited, included zinc oxide, slab zinc, rolled zinc, zinc dust, albalith, lithopone, zinc sulphate, feathered zinc, salt cake, sulphuric acid, muriatic acid and zinc chloride.

Literature designed to invite consideration of zinc spouting because of its durability and artistic appearance was distributed. Booklets to appeal to property owners, architects, and metal workers were included in this literature.

A flow sheet showing the progress of zinc from the ore to the various finished products was also shown. Those in charge were C. A. Stedman, advertising manager, Frank Breyer, chief chemist, W. H. Hendricks, A. E. Mervine, F. C. Ryan, B. C. Reynolds, F. W. Edwards, S. T. Ballinger, C. F. Beatty, H. W. Henderson and other sales representatives.

The Taylor Instrument Company, Rochester, N. Y., had an interesting exhibit and for the first time displayed the development of a temperature and time control particularly adaptable to vulcanization. A line of recording and indicating thermometers recording pressure gauges, automatic temperature and pressure regulators and time regulators, laboratory instruments and other instruments were shown. E. N. Hurlburt was in charge and was assisted by J. W. Schwartz and F. E. Ely.

DuPont Maintains Recepton Booth

E. I. DuPont de Nemours & Co., Wilmington, Del., did not feature their products at the exhibition this year but instead maintained an extensive and attractive reception booth where they welcomed their business friends. The four divisions of the company were represented and were in the hands of the following: Dyestuffs, in charge of H. G. Stephenson, New York manager of the dyestuff division; chemical products, in charge of R. L. Vital, sales manager of the New York division; acids and heavy chemicals, P. S. Tilden, sales director of the department; lithopone, dry colors and pigments, William Morpath, manager of the New York division.

The American Hard Rubber Co., New York, showed an iron sink with a lining of hard rubber super-imposed upon soft rubber, pipe and fittings, hard rubber centrifugal pumps in operation, battery jars, tanks, containers and other articles were also exhibited. A. M. Ackerman and D. Wilkins were at the booth.

Whitall, Tatum & Co., New York, maintained an interesting display which was in charge of W. W. Figgis, New York sales manager. This exhibit was conducted along educational lines and showed water bottles, syringes, bulbs, douches and air cushions of all kinds in the various steps of manufacture from the crude rubber to the completed article. A complete line of chemical glass ware was also on display and these articles were also shown in the various steps leading from the rough glass to the finished product.

A. Klipstein & Co., New York, exhibited a complete line of chemicals adaptable to the uses of all industries together with a number of interesting samples of dyed goods of all kinds. A. Klipstein, Jr., was in charge of the display.

The W. W. Sly Manufacturing Company, Cleveland, Ohio, maintained a complete dust collecting system in operation with pneumatic conveying pipe and separator for coarse and fine materials. D. E. Hadley, Eastern manager, and F. A. Ebeting, general sales manager, were at the booth.

Eimer & Amend, New York City, showed Rockwell hardness testers, Spencer refractometers and spectroscopes, Heusser balances, Hoetvett cryoscopes, revolving autoclaves, Thurston oil testers, Freas steam hot plates and steam and hot water mixers.

Proctor & Schwartz, Philadelphia, Pa., demonstrated a three-apron type dryer. E. B. Ayres, vice-president of the firm, was in charge of the display.

The Sturtevant Mill Co., Boston, Mass., maintained a reception booth for the purpose of disseminating information and literature relating to the company's products. D. Cantor and J. S. Vrabek were in attendance.

Hunter Dry Kiln Display

The Hunter Dry Kiln Co., Indianapolis, Ind., maintained an interesting exhibit which was in charge of O. M. Ragsdale, sales manager; Arthur B. Stonex, Eastern representative, and W. F. Thomson. The display consisted of the company's latest model dry kiln arranged in such a manner as to show its entire construction and working methods to the visitors. A number of samples of kiln-dried rubber were also on display.

The Luzerne Rubber Co., Trenton, N. J., maintained a display of hard rubber pipe, buckets and other articles designed for chemical purposes, battery jars, articles for electrical and water meter purposes and auto accessories. H. E. Case was in charge.

The Philadelphia Drying Machinery Co., Philadelphia, Pa., showed a line of dryers for all purposes. One of the main features of the display was a working model of the "Hurricane" continuous conveyor dryer. Other types shown included the cabinet tray dryer, truck tray dryer, sectional conveyor dryer, etc. Photographs showing the various types were also featured. W. W. Sibson, secretary and treasurer; C. H. Reumann, sales manager; E. K. Moore, S. Watson, H. C. Kaufmann and B. C. Beach were in charge.

W. L. Fleisher & Co., Inc., New York, showed a spray dryer in operation as well as samples of materials dried by this process.

The Brown Instrument Co.

The Brown Instrument Company, Philadelphia, Pa., displayed a line of indicating and recording instruments for measuring pressure, temperature and operations. A complete equipment for automatic temperature control in gas and oil furnaces and electric furnaces was shown. The new Brown direct reading resistance thermometer was also featured. George W. Kellar, sales manager; J. P. Goheen, secretary, and J. D. Andrews, manager of the New York office were in charge of the exhibit.

The Carrier Engineering Corporation, Newark, N. J., showed a complete Carrier air conditioning machine equipped with automatic controls and in full operation. An ejector compartment in operation was also shown. A special steam pipe construction, steam jacketed pipe, humidifier, humidity control devices were shown. A section of control instruments were on exhibit as was also a small dry room equipped with a dryer and a Carrier ejector system of air distribution. J. E. Bolling was in charge of the display.

The Apex Chemical Co., Inc., New York, exhibited samples of oils, sizings, softeners and an extensive line of chemicals made for the textile, leather, printing ink, rubber and fur dyeing industries, together with finished products from each of these industries to demonstrate the results obtained from the use of their products. The exhibit was in charge of Dr. S. M. Hermann, Hugo Helburn and C. B. Rasenberger.

The Bristol Company, Waterbury, Conn., showed a line of temperature controls recording pressure and vacuum gauges, and recording thermometers. The display was in charge of H. L. Griggs, general sales manager of the firm.

Sherwin-Williams Co. Exhibit

The Sherwin-Williams Company, New York, maintained a large exhibit of aniline dye intermediates as well as the dyes themselves. Dry colors and fur dyes were featured. In addition to this a combination of formaldehyde and aniline oil which is known to the rubber trade as "formaline" and which is an accelerator was also shown. The exhibit was in charge of A. W. Steubel, assistant manager of the dye chemical and color sales department. J. O. Hasson, manager of general dye color sales department, Cleveland; L. D. Walker, W. F. Prescott, B. N. Van Cleve, W. R. McIntosh, Fred Wills, A. J. Binder, M. K. Barrett, R. V. Brown and C. E. Buchanan.

Paul O. Abbe, Inc., New York City, featured an interesting display of physical division machinery. The machinery which was constantly in motion consisted of pebble mills, ball mills, mead mills, rubber rotary cutters. P. O. Abbe, John Buckley and Harry Sellman were in charge.

J. P. Devine Co., Buffalo, N. Y., showed a quadruple effect evaporator, a vacuum chamber dryer, a rotary dryer and an impregnating apparatus. J. P. Devine and L. W. Graves were in charge of this display.

The Buffalo Foundry & Machine Company, Buffalo, N. Y., did not follow its usual custom of exhibiting their various lines of machinery but instead maintained a booth which was devoted primarily to receiving their many friends and customers. H. D. Miles, president of the company, was on hand as was E. G. Rippel, sales manager, of the firm. Photographs of the company's machines were displayed in the booth as were a number of dried and evaporated materials.

The Manhatten Rubber Co.

The Manhattan Rubber Co., Passaic, N. J., featured a line of rubber goods adaptable to mechanical uses. Among the line shown were hard rubber lining and covering for hydro-extractor baskets, blowers, fans and pipes as well as other metal parts requiring a protection from acid. A hard rubber lined and covered hydro-extractor basket was one of the features of the display. In addition to this there was a moving display of a "Condor" three inch three ply belt which was kept running through a bath of hot water. H. E. Smith, W. A. Pritchard and J. E. Skane were in charge of the display.

The Grinnell Company, Providence, R. I., had an interesting exhibit consisting of dryers, humidity controllers, psychrometers, sprinkler heads, cast iron and brass fitters and pipe hangers. F. J. Orme, Frank M. Sackett and William Muller were in attendance at the booth.

Of Interest to Manufacturers

An efficient alloy which may be used in the construction of the linings of rubber moulds used in the vulcanization process consists of 97 per cent aluminum and 3 per cent magnesium. The entire mold may be made from the alloy or only the lining. In the former case the metals are mixed together and heated in a crucible and poured right into the sand and used without machining. This alloy is not attacked by the sulphur in the rubber.

A new accelerator, which bears the name XLO, is recommended very highly for the manufacture of tires, inner tubes and technical rubber specialties of a superior quality. It consists of two parts of diphenyl guanidine and one part of magnesia. It is used in proportions which vary from 0.25 per cent to 0.75 per cent of the weight of the rubber.

NEWS OF THE INDUSTRY

News -- Personals -- Financial -- Building Activities -- New Products

News from the Rubber Metropolis

Business Improvement Predicted in Near Future—Firestone Export Department Transferred to Akron—Griffin at Akron University—Quality Rubber Founded—Seiberling May Control Portage

Business Improvement Predicted

The most hopeful sign reported in rubber circles in Akron during the latter part of September was a tendency toward hardening of prices. It has been repeatedly pointed out by financial writers and expert statisticians that when prices hardened the turn for the better had arrived. Hence it would appear that the rubber industry is well on the road to recovery.

There has been some talk of price changes in the rubber industry for some time past. None of these reports pointed to further reductions. All predicted reboundsin many lines.

The first real news to leak out came from the B. F. Goodrich Rubber Co. in the form of increased prices for certain lines of fire hose and other products of that great factory. It is expected that new price lists will be given the trade within a short time.

Akron is confident that the upward swing has set in and that a slow but steady growth toward what has been termed normalcy by our first citizen is in progress. It cannot be expected it is said, that the casual observer will see any improvement in rubber business for some time to come. But the improvement will be taking place all this time.

It is predicted that the real upward swing will not start until after the first of the coming year and that so slow and steady will be the trend for the better that what most people are pleased to term "good times" will be with us by fall without the ostentation of boom times.

At present the rubber companies in the Akron district are not taking on new employes or calling back former workers. In fact there have been quite a few instances of reductions in factory personnel of late. But this is explained as the natural reaction from the rush of tire orders for summer use. Now that fall has come, tires are not so much in demand.

Akron companies are maintaining a fairly good output of tires, but it is hinted that this production will be decidedly cut before it starts back to the figure reached during the peak of the 1921 summer demand.

Certain statisticians connected with business boards in Akron figured that tire production has dropped back to 75,000 a day when September was ushered in. These same persons predict that this output may drop to half that figure before the winter holidays. The production they say, demands largely upon the ability of the automotive industry to recover from the late depression. If car makers are active during the winter months in preparation for next spring's business, there will be a good demand for tires for original equipment. This demand will keep the wheels humming in the Akron factories.

There is far less pessimistic talk current in Akron business circles now. Those persons who have been harping about the prospects for a hard winter have stopped their pessimistic predictions, even if they have not been convinced that depressions cannot last forever.

Firestone Exports from Akron

(Special Akron Correspondence)

The Firestone Tire & Rubber Co. has transferred its export department from New York City to the general offices in Akron, bringing to the parent plant G. T. Currier, F. C. Allen, W. H. Snyder and G. L. Livingston. The warehouse and shipping department for the export trade will remain in New York under direction of L. A. Latour.

Griffin at Akron University

(Special Akron Correspondence)

F. S. Griffin, for ten years assistant-chief draftsman of the Firestone Tire & Rubber Co., has been elected head of the machine design department of the Municipal University of Akron.

Quality Rubber Founded

The Quality Rubber Company is the name of a new firm capitalized by William and Charles Kurtz, Lloyd Swineford and Frank Saltsman to engage in the manufacture of rubber novelties at Ashland, Ohio, where a building has recently been purchased. The building is admirably adapted for a rubber factory and some years ago was used for that purpose by Eagle Rubber Company before its new building was erected.

The Quality Rubber company has purchased machinery which will be installed at once and it is expected to have the plant in operation in about six weeks. About twenty-five people will be employed at the start. Toy balloons and various rubber novelties will be manufactured.

Seiberling May Control Portage

It is stated on good authority that the name of the new tire manufacturing organization which is to be headed by Frank A. Seiberling, former president of the Goodyear Tire & Rubber Co., will be the Seiberling Tire & Rubber Co. and that headquarters will be at Akron.

Attorneys representing Mr. Seiberling recently made an offer of $750,000 for the plant of the Portage Tire & Rubber Co., at Barberton. John W. Maguire, who was vice-president and general manager up to the time the company went into bankruptcy and later was appointed one of the receivers, has resigned.

The Seiberling interests are making efforts to acquire the Republic plant at Youngstown, Ohio, as previously reported.

In addition to the Newcastle, Pa., plant which the Seiberling interests have already acquired, and the Portage plant, it is thought they will eventually acquire the plant of the Marion Tire & Rubber Co., at Marion, Ohio.

Fisk Bond Issue

An issue of $10,000,000 first closed mortgage, twenty-year eight per cent sinking fund gold bonds of the Fisk Rubber Company is offered today by Dillon, Read & Co. at 99 and interest, to yield 8.10 per cent. The bonds are noncallable until September 1, 1931, on which date and thereafter they are callable only as a whole at 117½ and interest until September 1, 1936, and thereafter at 112½ and interest. A semi-annual sinking fund sufficient to purchase the entire issue if obtainable at or below 110 and interest is provided.

In connection with this financing, the Fisk Rubber Company is to consolidate, through the acquisition of their properties, with the Federal Rubber Company and the Ninigret Company. Both concerns have been controlled through stock ownership and operated under the supervision of officers of the Fisk Rubber Company. The consolidation is expected to result in substantial economies in operation and management. During the life of the bonds, control of the company, through the right to elect two-thirds of the board of directors, will be vested in James Dean, of Dillon, Read & Co.; Otis H. Cutler, Chairman of the American Brake Shoe & Foundry Company and H. T. Dunn, President of the Fisk Rubber Company, or their successors, through the issue of management stock.

The corporation's net earnings of 1920 were $7,244,551. The company estimates that net income available for interest and taxes for the twelve months to June 30, 1922, will be more than $7,500,000.

Trade Association Aids in Cooperation

Rubber Manufacturers Association of New Jersey Making its Influence Felt Throughout New Jersey and Neighboring States— A Short History of the Organization

A rubber trade organization that has done a great deal to promote the interests of its members and bring about a spirit of cooperation is the Rubber Manufacturers' Association of New Jersey, which until recently was known as the Rubber Manufacturers' Association of Trenton. Although at first a purely local association, it has now extended its scope so that firms in New Jersey and neighboring states, whose interests by reason of their location or the character of their business are to a great extent similar to those of the Trenton manufacturers, are eligible to membership in it.

The success of the association is due in large measure to the timely efforts of John A. Lambert, the treasurer and general manager of the Acme Rubber Mfg. Co., who presided over its destinies during the first three years of its existence, and succeeded in demonstrating the value of a regional association in the rubber industry. This work so ably begun is now being energetically carried forward by John S. Broughton, president of the United & Globe Rubber Co., who was elected the president of the association December 1919, and has already brought about the incorporation of the association and was instrumental in the association's holding an unusually successful summer outing last June at which mechanical rubber goods manufacturers from this country and Canada were entertained.

It is to be noted that this association does not aim in any way to duplicate the

TREASURER A. BOYD CORNELL

work of the Rubber Association of America, but rather supplements the work of the larger association and works at all times in harmony with it.

The first meeting with a view to forming an organization was held at the Trenton Country Club, on October 27, 1915, at a time when the British Rubber Embargo was causing manufacturers throughout the industry to realize the benefits to be derived from an organization in dealing with some questions.

At this first meeting, Mr. Lambert was chosen chairman and the late Alfred

PRESIDENT JOHN S. BROUGHTON

Whitehead, of the Whitehead Bros. Rubber Co., secretary. Thirteen firms were represented and it was voted to form a preliminary organization to be known as the Rubber Manufacturers' Association of Trenton, for the purpose of conferring together on questions of mutual interest and considering problems pertaining to the rubber industry, to endeavor to check proposed legislation that might be regarded as detrimental to the best interests of the industry, as well as to promote social acquaintance among Trenton rubber manufacturers.

All meetings since the beginning have been held at the Trenton Country Club on which occasions dinner is served and a portion of the time given over to social enjoyment.

On February 15, 1916 formal organization was effected to include all rubber manufacturers in Mercer County, New Jersey, and the following officers elected: president, John A. Lambert, Acme Rubber Manufacturing Co.; vice-president, John S. Broughton, United & Globe Rubber Co.; secretary, Robert J. Stokes, Thermoid Rubber Co.; treasurer, Alfred Whitehead, Whitehead Bro. Rubber Co. Membership dues were fixed at $100 per annum and the first Monday of every second month was set as the regular meeting day, excepting the annual meeting, which was set for the second Monday in December. Provision was made for standing committees on publicity, legislation, finance, investigation and transportation.

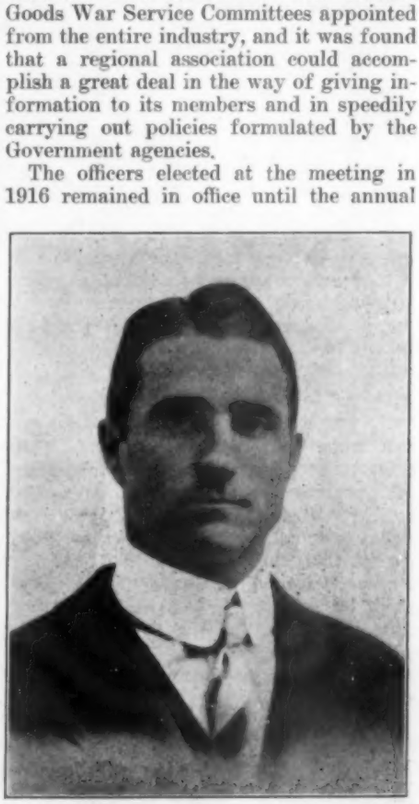
On October 16, 1917 the Trenton Association entertained the Rubber Association of America at a golf tournament at the Trenton Country Club which was followed by dinner and a speech by ex-Governor Stokes, of New Jersey. This was largely attended and was one of the principal social events in the history of the organization. They also entertained the Rubber Association of America a second time at a golf tournament on September 25, 1918.

On August 29, 1918 the association was called together by President Lambert, who was industrial chairman of the Rubber Products Division, of the War Resources and Conversion Committee of the Fourth Regional District, which included New Jersey, eastern Pennsylvania, and Delaware, for a survey of the rubber industry in that district. The detailed information furnished the Government at that time, including the number of plants and capacity production of each, together with the character of the product and the possibilities of conversion to war uses, was of material assistance to the authorities at Washington having in charge the war mobolization of industries.

As a result of this meeting and those that followed the Quaker City Rubber Co., of Philadelphia, the Vulcanized Rubber Co., of Morrisville, Pa. and the Electric Hose & Rubber Co., of Wilmington, Del. came into affiliation with the association.

Throughout the duration of the war the Trenton Association worked in close touch with the Tires and Mechanical Rubber Goods War Service Committees appointed from the entire industry, and it was found that a regional association could accomplish a great deal in the way of giving information to its members and in speedily carrying out policies formulated by the Government agencies.

The officers elected at the meeting in 1916 remained in office until the annual



SECRETARY W. HENRY SAYEN, JR.

meeting in December, 1919, at which time new officers were elected as follows: president, John S. Broughton, United & Globe Rubber Co.; vice-president, Charles E. Stokes, Home Rubber Co.; secretary, W. Henry Sayen, Jr., Mercer Rubber Co.;

treasurer, Alfred Whitehead, Whitehead Bros. Rubber Co. Trustees—John S. Broughton, Charles E. Stokes, Alfred Whitehead, W. H. Sayen, Jr. John J. Vorhees, president of the Vorhees Rubber Mfg. Co., Jersey City.

Mr. Whitehead died on February 3, 1920, and the present treasurer, A. Boyd Cornell, general manager of the Hamilton Rubber Mfg. Co., was elected to succeed

THE LATE ALFRED WHITEHEAD

him both as treasurer and trustee.

At the annual meeting in December, 1920, the same officers were re-elected, and it was decided to change the name of the organization to the Rubber Manufacturers' Association of New Jersey in order to widen their scope of activities, and it was also decided to incorporate under the New Jersey laws.

Incorporation has now been accomplished, a charter having recently been granted by the State of New Jersey.

The present membership is as follows: Acme Rubber Mfg. Co., Trenton, N. J.; Ajax Rubber Co., Trenton, N. J.; Bergougnan Rubber Co., Trenton, N. J.; Crescent Insulated Wire & Cable Co., Trenton, N. J.; Electric Hose & Rubber Co., Wilmington, Del.; Empire Rubber Co., Trenton, N. J.; Essex Rubber Tire Mfg. Co., Trenton, N. J.; Globe Rubber Tire Mfg Co., Trenton, N. J.; Hamilton Rubber Mfg. Co., Trenton, N. J.; Home Rubber Co., Trenton, N. J.; Joseph Stokes Rubber Co., Trenton, N. J.; Luzerne Rubber Co., Trenton, N. J.; Mercer Rubber Co., Hamilton Square, N. J.; New Jersey Car Spring & Rub., Co., Jersey City, N. J.; Quaker City Rubber Co., Philadelphia, Pa.; Semple Rubber Co., Trenton, N. J.; Thermoid Rubber Co., Trenton, N. J.; United & Globe Rubber Co., Trenton, N. J.; Vulcanized Rubber Co., Morrisville, Pa.; Voorhees Rubber Mfg. Co., Jersey City, N. J.; Whitehead Bros. Rubber Co., Trenton, N. J. and Woven Steel Hose & Rubber Co., Trenton.

An enjoyable outing of the association was held at the Trenton Country Club on June 21 last, at which time a number of manufacturers of mechanical rubber goods from all parts of this country as well as Canada were entertained. There was a golf tournament at which a number of handsome prizes were contested for. Among those present from outside the membership of the Association were: George E. Hall, president and general manager of the Boston Woven Hose & Rubber Co., Cambridge, Mass., C. E. Cook, head of the mechanical rubber goods department of the B. F. Goodrich Rubber Co., Akron, Irving R. Bailey, head of the mechanical rubber goods department of the Goodyear Tire & Rubber Co., Akron, J. H. Cobb, president of the New York Belting & Packing Co., New York, John H. Kelly, vice-president and general manager of the Hewitt Rubber Co., Buffalo, D. E. Beynon of the Dunlap Tire & Rubber Goods Co., Ltd., of Toronto, Canada, Mr. McCrea of Goodyear's Toronto plant and A. L. Viles, general manager of the Rubber Association of America.

French Chemists to Meet

The Society of Chemical Industry of France will hold its annual meeting at Paris, October 9, 10, 11 and 12. Special subjects will be treated by those most eminent in each department. The sessions will be held at the Conservatoire des Arts et Metiers, and a banquet will held at the Palais d'Orsay at which M.

JOHN J. VOORHEES

Lefebore, minister of Agriculture, will preside. Opportunity will be given to visit chemical factories and laboratories.

Wilson Sails for Europe

Charles T. Wilson, president of the Charles T. Wilson Co., Inc., crude rubber importers of 56 Wall street, New York sailed for Europe on the steamship *Olympic* on September 3. He expected to visit England and the Continent.

OUTING OF RUBBER MANUFACTURERS ASSOCIATION OF NEW JERSEY AT THE TRENTON COUNTRY CLUB, JUNE 21

News of the Rubber Association

General Instructions on Standard Method of Tests Approved—Department of Agriculture Interested in Jar Rings—Tire Ratings Reduced—Import Duty for Returned U. S. Goods

A. R. A. Approves "General Instructions on Standard Method of Tests"

The Rubber Association has just received advice that the Committee on Specifications and Tests for Material of the American Railway Association has formally approved the "General Instructions on Standard Methods of Test" which were formulated by a Joint Committee composed of the Specification Committee, Mechanical Goods Division of the Rubber Association, and a Sub-Committee of the A.R.A. Committee just mentioned.

The General Instructions, as might be assumed from its name, forms a general basis for the testing of mechanical rubber goods commonly used by railroads, such as steam hose, air hose, tender hose, axle light belting, etc.

The specifications for tender hose, steam hose, long length air hose and axle light belting are now receiving consideration by the A.R.A. Sub-Committee, which has been working with the Rubber Association's Specification Committee, and it is hoped that final approval of them will have been obtained within a short time.

The purpose of the Specification Committee of the Rubber Association in cooperating with the American Railway Association in this work, should not be misunderstood. The specifications and General Instructions which have been prepared will be presented to all members of the American Railway Association, embracing all common carriers in the United States, as standard practice, which will go a long ways toward eliminating the multitudinous requirements promulgated by each railroad covering a given product, which obviously causes trouble and unnecessary work for the manufacturer.

Dept. of Agriculture Interested in Rubber Jar Rings

In co-operation with the Bureau of Standards, of the Department of Commerce, the Department of Agriculture, at Washington, has for some time past been making a study of the use of rubber jar rings for canning purposes, and as a result thereof the Bureau of Standards will issue a new specification covering that article.

The Specification Committee, Mechanical Goods Division of the Association, has been requested to study the requirements contained in the old specification and to offer its comments or criticisms with respect thereto, so that the new specification, when in final form, will have had the approval of everyone interested.

Canadian Ratings on Pneumatic Tires Reduced

The Canadian Classification Committee, representing common carriers in the Dominion, recently declined the application of Canadian tire manufacturers which requested the establishment of a third-class rating on pneumatic tires in carloads, minimum weight 20,000 pounds.

The question was appealed to the Canadian Board of Railroad Commissioners and the application extended to include the establishment of first-class rating on pneumatic tires in less carloads in paper wrapped bundles or bales when strapped with metal bands.

The Board of Railroad Commissioners has just issued an order granting the application, but the effective date of the change has not as yet been announced.

Virginia Classification Pneumatic Tire Rating Reduced

In line with the policy of the Traffic Committee to bring about the greatest uniformity possible in classification ratings on pneumatic tires, the Virginia State Corporation Commission was petitioned to revise its classification so as to make it conform to the Consolidated Classification rating and packing specifications for pneumatic and solid tires in carloads and less than carloads.

The Association has just received advice that the State Corporation Commission has authorized the revision of the Virginia classification in accordance therewith, but the effective date of this change has not as yet been announced.

90 per cent Import Duty Provided on U. S. Goods Returned from Abroad

On August 12, the House of Representatives passed a joint resolution (H.J. Res. 183) imposing an import duty of 90 per cent *ad valorem* on the original value of all American goods which have been shipped abroad for the use of American Expeditionary Forces in Europe or the Allies of the United States during the war, subsequently sold in Europe and which are now sought to be reimported into the United States.

The resolution, as first introduced, provided that this law shall apply only to those articles exported from the United States prior to February 11, 1919, but upon its reference to the Senate Committee on Finance, which favorably reported it to the Senate on August 22nd, an amendment was introduced providing that the resolution shall not apply to goods purchased prior to August 15, 1921, and returned to this country prior to November 1, 1921, having met with certain certification requirements of the United States Treasury.

The resolution will doubtless be held over until Congress reconvenes in September, and it might be thought advisable by our members to communicate with their Senators during the coming recess for the purpose of urging the passage of the resolution with the amendment referred to stricken therefrom.

Tire Production Statistics Issued

The Rubber Association of America has recently issued statistics on tire production, shipments and inventory covering pneumatic tire casings, inner tubes and solid tires. These figures, designed for the Department of Commerce, show that manufacturing has increased and has been accompanied by a decrease in the stocks held throughout the country. The figures are given by months from November 1920 to August 1921 and are as follows:

PNEUMATIC CASINGS

	Inventory	Production	Shipments
1920			
Nov.	5,880,016	649,742	806,023
Dec.	5,508,380	506,111	1,327,153
1921			
Jan.	5,319,605	703,430	965,417
Feb.	5,193,018	819,892	1,073,756
Mar.	4,597,103	1,163,314	1,614,651
Apr.	4,527,445	1,651,418	1,785,951
May	4,451,668	2,100,917	2,085,882
June	4,154,456	2,313,265	2,643,850
July	3,892,037	2,570,524	2,757,581

INNER TUBES

1920			
Nov.	6,131,935	742,815	920,938
Dec.	5,786,929	508,446	1,481,285
1921			
Jan.	5,586,163	740,824	1,042,617
Feb.	5,415,464	916,627	1,129,881
Mar.	5,044,861	1,346,483	1,643,690
Apr.	4,916,772	1,762,122	1,983,571
May	4,751,880	2,210,040	2,342,567
June	3,835,098	2,359,928	3,232,673
July	3,122,815	3,020,981	3,603,248

SOLID TIRES

1920			
Nov.	298,875	21,355	34,217
Dec.	303,473	16,297	40,828
1921			
Jan.	303,753	21,220	29,116
Feb.	304,374	23,365	29,599
Mar.	283,800	28,710	43,926
Apr.	269,985	28,859	42,080
May	264,633	35,156	40,122
June	240,336	28,395	49,867
July	220,003	35,123	55,678

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic stock in factory and in transit to, or at, warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

Sandusky Grants Ajax Extension

As a result of the referendum taken by the Chamber of Commerce of Sandusky, Ohio, among the subscribers to the fund for the purchase of a site for the proposed factory of the Ajax Rubber Co., Inc., at Sandusky on the application of the company for the extension of the time limit for the erection of the factory for one year, the request for extension was granted by a vote of 80,990 points in favor and 17,850 points against.

Of 212 subscribers to the fund 181 favored the extension and 31 were opposed. Referendum points were based on the amount of each individual's subscription.

New Crude Rubber Business

Alfred B. MacNamara and E. Weber have formed a partnership to conduct a crude rubber brokerage under the firm name of McNamara & Weber. They have opened offices at 136 Liberty street, New York. Both members of the firm have been in the trade for several years.

Personals of the Trade

Reynolds Opens Offices in Akron—Rittenhouse District Manager for Star Rubber—India Announces Appointments—Faultless Salesmen at Convention—Harry Hunter Passes Away

Reynolds Opens Offices in Akron

The Reynolds Machine Co., manufacturers of rubber mill equipment, including tire molds, cores, dies, etc., Massillon, Ohio, in order to give their customers in the Akron district more efficient service have opened sales headquarters at 48 East Exchange Street, Akron, with Dana E. Williams in charge.

Mr. Williams is well known in the rubber industry having been connected

DANA E. WILLIAMS

with it for more than twenty years, the last twelve of which were spent with the Firestone Tire & Rubber Co., Akron, in charge of their machine shop, in the engineering department and in the purchasing department.

Rittenhouse District Manager for Star

L. K. Rittenhouse has succeeded L. I. Ris as Eastern district manager of the Star Rubber Company, Inc., whose offices are located at 226 West 52nd Street, New York City. Mr. Rittenhouse has had fourteen successful years of actual experience in the tire industry as salesman, branch and district managers with Diamond, Goodrich and Firestone companies, and has accumulated a host of personal and business friends who will be pleased to wish him success in his new field of endeavor.

India Announces Appointments

According to an official statement just released, the tire and tube sales of the India Tire & Rubber Company have been increasing by leaps and bounds. The Texas organization alone, in charge of H. L. Corbett, has, since last July opened up seventy-eight new accounts.

One of the more recent additions to India's executive sales staff is J. R. Hoffman, formerly connected with The Norwalk Tire & Rubber Company, of Norwalk, Conn. Mr. Hoffman has spent a good many years in the tire business, and as district manager will have charge of the India Company's sales in the state of Pennsylvania. He will make his headquarters at Harrisburg.

P. E. Bates, for the past five years affiliated with the Mohawk Tire & Rubber Company, of Akron, Ohio, has identified himself with the India Tire & Rubber Company. In his new capacity as district manager, Mr. Bates will look after the India Company's interests in northern Ohio.

Faultless Salesmen at Convention

The names of the salesmen and representatives of distributing agencies, also direct factory and special representatives, who attended the Week's "Wearever" Convention of the Faultless Rubber Co., at Ashland, Ohio, August 3, 4 and 5, as reported in the August 25 issue of THE RUBBER AGE, were as follows:

Chicago—Darrell G. Chatard, F. A. Starr, A. C. Levis, C. A. Bruhn, W. H. Muschlet.
Detroit—A. L. Grubbs, D. MacMillan, F. D. Hardoin and H. T. Carver.
Pittsburgh—Robert Nesbit, Sr., Robert Nesbit, Jr., C. H. E. Gross, Walter P. Marble.
Columbus—Theo. Dill, George H. Huff.
Providence—T. Frank Thompson.
Philadelphia—Walter H. Smith.
St. Paul—V. J. Rogers.
Kansas City—A. L. Seavers.
San Francisco—F. E. Aher.
Seattle—F. H. Schrader.
Richmond, Va.—E. C. Toone, Geo. Roebuck.
New York—A. W. Weeks.
Tampa, Fla.—Geo. Miller.
Montreal—J. G. Stenhouse.
Troy, N. Y.—M. T. Hewitt.
Memphis, Tenn.— Barry M. Ellis.
Evansville, Ind.—Geo. E. Hartweck.
Dallas, Tex.—F. J. Williams.
St. Louis—N. N. Robnett.
New Orleans—C. E. Smuck.
Los Angeles—W. H. Dotson.
Washington, D. C.—J. R. O'Neill.
Wichita, Kans.—T. C. Combs.

O'Neil Visits Europe

M. O'Neil, president of the General Rubber Co., Akron, Ohio, sailed for Europe on September 24 for a tour of England, France, Germany, Italy and Spain.

Hall Returns from Abroad

George E. Hall, president and general manager of the Boston Woven Hose & Rubber Co., Cambridge, Mass arrived in New York on the steamship *Olympic* on September 20 after a three months European tour.

Harry Hunter Passes Away

Harry Hunter of Indianapolis, Ind., president of the Hunter Dry Kiln Company, Indianapolis, Ind., died on board ship August 29 enroute home from England where he had been attending the Fifth International Rubber Exposition. His death was due to uremia and came as a decided shock to his many friends.

Mr. Hunter gained prominence in the rubber industry through the development of a method of drying and processing rubber. This process the patent for which bears his name and is controlled by the Hunter Dry Kiln Company consists of conditioning rubber by means of employing the important natural element of humidity in connection with the pro-

HARRY HUNTER

per temperature and circulation of air. Mr. Hunter's discovery entirely revolutionized this phase of the rubber industry and the many units of the Hunter System now in use are a testimonial to the results of his untiring efforts.

His genial and loving nature endeared him to his many friends and his death is keenly felt. He was fifty-five years old and was active in the various Masonic orders and numerous business organizations. He is survived by a wife and three daughters.

Williams Now in New York

H. Evan Williams, formerly Akron representative of Horn & Leavitt, the crude rubber brokers of 50 Broad street, New York, is now making his headquarters at the New York office.

Bass Joins Lewis Forces

Walter H. Bass who was formerly in the crude rubber brokerage business at Akron, Ohio, is now managing the crude rubber department of John D. Lewis & Co., 2 Cliff street, New York.

Crude Rubber Consumption for 1921

Recently Issued Estimate Stating Consumption of 100,000 Tons Held to be Low—Estimates Place 150,000 Tons as Being Nearer Actual Amount

Total crude rubber consumption by United States manufacturers during the year 1921 is occasioning some discussion in the trade at the present time on account of the circulation of an estimate that approximately 100,000 tons would be used. This is generally thought to be much too low. It is estimated that 150,000 tons will come much nearer the actual total.

In making such an estimate the figures compiled by the Rubber Association of America during the past five years are the only reliable data. While these figures are not absolutely complete, on account of some manufacturers not answering questionnaires, they represent about 85 per cent of consumption. An addition of 15 per cent is made in order to obtain approximate totals.

If the Rubber Association figures could be made complete, they would become even more valuable to the industry, and it is much to be hoped that all manufacturers will finally answer the questionnaires especially as all individual replies are now to be kept at the offices of the Rubber Association itself, and will not be subject to the scrutiny of any organization outside the trade. They will be seen only by the general manager and the assistant manager.

The crude rubber consumption statistics for 1917, 1918, 1919 and 1920 show the following totals:

In 1917	147,613	tons
In 1918	*144,021	"
In 1919	181,353	"
In 1920	166,298	"

* estimated.

The statistics for the first half of 1921 are not yet available, but will be given out soon. It seems fair to assume that these figures will show a somewhat greater consumption than during the last half of 1920 when, it is generally conceded, the depression in the industry reached its lowest point.

The figures for the last half of 1920 showed a consumption of 52,830 tons by manufacturers reporting. Adding 15 per cent for those not reporting would make a total consumption for the last half of 1920 of 60,755 tons. This same rate of consumption for the entire year 1921 would make a total consumption 121,510 tons, but it is thought consumption during 1921 will be at least 20 per cent greater than during the last half of 1920, which would give an estimated total of 145,812 tons for 1921—or about the same as the estimate for the year 1918 when war restrictions were in force.

In this connection it is interesting to compare consumption during the first half of 1920 when the industry was at its peak. The Rubber Association compilation of statistics from 142 manufacturers representing approximately 85 per cent of the total showed 255,168,003 pounds of crude rubber consumed, or 113,914 long tons. This same rate of consumption, if it had been maintained throughout the year, would have given a total consumption of 227,828 tons. Adding 15 per cent for manufacturers not reporting, a total of 262,002 tons is arrived at—a figure representing more rubber by 35,000 tons than was ever imported in a single year.

Exports of Rubber Goods for July

Exports of rubber goods for July, 1921, show an increase when compared to similar statistics for the month of June. According to the figures recently issued by the Bureau of Foreign and Domestic Commerce of the Department of Commerce the value of rubber goods exported during July, exclusive of exports to Porto Rico and Hawaii, amounted to $2,718,680. Exports for June amounted to $2,425,179. Exports to Porto Rico and Hawaii show a falling off for July when they totalled $166,476 as compared to $191,130 for June.

The total value of the various articles exported, not including those sent to the above mentioned islands, were as follows: belting, $79,444; hose, $125,363; packing, $46,689; boots, $80,690; shoes, $225,016; druggists' rubber sundries, $39,004; soles and heels, $32,160; auto tire casings, $1,046,981; inner tubes, $104,739; solid tires, $66,645; all other tires, $22,061; all other manufactures of rubber, $352,970; insulated wire and cables, $496,928.

Exports to Porto Rico and Hawaii for July were as follows: belting, hose and packing, $14,774; automobile tires, $119,539; all other tires, $372; all other manufactures of rubber, $31,791.

Williams Heads McGraw Branch

Announcement is made of the recent appointment of C. G. Williams as manager of the McGraw Tire & Rubber Company's Cleveland branch, following the vacancy arising out of the promotion of D. C. Hathaway to the assistant sales managership. For some time past, Mr. Williams has been fuctioning as assistant branch manager. For many years he was identified with the automobile and tire industries in the Southwest; his recent asdustries in the Southwest; his recent associations however, have been in Cleveland.

New England Tire Re-Elects Officers

At the stockholders meeting of the New England Tire & Rubber Co., Holyoke, Mass., on September 15 the following directors were elected: John Kearns, E. J. Kearns, C. S. Huntley, J. S. Berstein, F. E. Morris, Joseph F. Ranger and Gilbert B. Bogart. Officers for the ensuing year were re-elected as follows: President John Kearns; vice-president, E. J. Kearns; secretary, J. S. Bernstein, and treasurer and general manager, C. S. Huntley.

Rubber Importations for August

Importations of crude rubber into the United States during August, 1921, are somewhat larger than the importations during the month of August, 1920, according to the monthly report of the Rubber Association of America. According to the statistics the importations for August, 1921, amounted to 13,974 tons while those for August, 1920, were 13,564 tons. Total importations for the first eight months of 1921 ending August amounted to 104,378 tons, a decided falling off as compared with the corresponding period during 1920 when the importations of rubber amounted to 181,337 tons.

Following are the importation statistics in detail:

PLANTATIONS

From	Tons
Batavia	71
Belawan-Deli	743
Colombo	2,031
Liverpool	186
Malacca	511
Pt. Swettenham	22
Rotterdam	2,919
Singapore	6,307
Sourabaya	241
	13,031

AFRICANS

From	Tons
Lisbon	21
Liverpool	20
	41

CENTRALS AND GUAYULE

Centrals (Mexico and Central America)	3
Guayule (Mexico)	—
	3

PARAS

Iquitos	166
Manaos	421
Para	312
	899

GUMS, WASTE RUBBER, ETC., IMPORTED FROM VARIOUS SOURCES

	Tons
Waste	22
Balata	21
Miscellaneous Gums	102

COMPARISON 1920-1921

	Aug.-1920	Aug.-1921	Total Importations eight months ending, August 31, 1920	1921
Plantations	12,730	13,031	161,828	95,493
Paras	590	899	14,514	7,996
Africans	13	41	3,657	757
Central	75	3	665	71
Guayule	156	—	660	58
Manicoba and) Matto Grosso)	—	—	13	3
	13,564	13,974	181,337	104,378

ARRIVALS PLANTATIONS FOR AUGUST, 1921, SHOWING PORTS OF ORIGIN AND ARRIVAL

From	Arrived at	Tons
Batavia	New York	71
Belawan-Deli	New York	743
Colombo	New York	1,726
Colombo	Boston	305
Liverpool	New York	186
Malacca	New York	511
Port Swettenham	New York	22
Rotterdam	New York	2,919
Singapore	New York	6,192
Singapore	*Seattle	* 115
Sourabaya	New York	241
		13,031

ARRIVALS OF PLANTATIONS BY PORTS

Atlantic Ports		
Boston	305	
New York	12,611	
		12,916
Pacific Ports		
*Seattle	* 115	
		13,031

* Imported prior to month of August but not shown in previous reports.

MARKETS

Cottons, Yarns and Fabrics

NEW YORK, SEPTEMBER 20, 1921

The first two weeks in September were the most extraordinary in the history of the cotton industry both as to the raw material and cotton fabric. Following the phenominal rise in the price of raw cotton immediately upon the government report of a condition of 59,3, quotations fell and advanced in a wild manner for ten days. Firms that had withdrawn their lines and would not under any circumstances make quotations on staple fabrics during the first days of the chaotic cotton market, were slow to come back. And then such quotations as were given were subject to confirmation by the mill, with the very certain possibility of a price change in a market where the fluctuations in the raw material was showing a spread of 200 points in a single day. At this writing prices on staple fabrics are nominal; there being no way to determine upon a trading basis until cotton prices assume a steadier condition. The seller is sitting tight and the buyer is waiting.

The advance in cotton has had a stimulating effect on other products owing to the ramifications of its uses, and is one of the greatest influences in the revival of the general business of the country. At this point the action of the American Cotton Association with regard to next year's crop is interesting. The Association is asking an expression from its members throughout the cotton growing belt in the south regarding another drastic cut in cotton production in 1922. It is said that it is also making inquiry of its members as to the policy of petitioning the governors of all the cotton growing states to call a special session of the legislature to enact laws prohibiting the planting of any cotton in 1922 as a means of entirely destroying the boll weevil which has cut Southern agriculturists many millions this year.

The Bureau of Foreign and Domestic Commerce report total of exports of cotton during August as 495,130 bales weighing 254,739,435 pounds and valued at $30,361,045. This report shows a large increase in volume and a slight increase in value as compared with cotton exports for August 1920 which totalled 146,668 bales weighing 74,767,391 pounds and valued at $28,051,552. Total exports for the first eight months of 1921 were 3,789,236 bales weighing 1,958,818,466 pounds valued at $273,932,046.

EGYPTIAN COTTON

As a result of the relatively large demand and small supply of upper Egyptian cottons new high record prices for the year for these grades were established early in the month. The previous high level was reached about the middle of April; Uppers then sold for 20 1/16 cents and medium Sakelarides at 30¼ cents. The lowest prices of the year came in February when medium Uppers sold at 15½ cents and medium Sakelarides at 18½ cents. There is a scarcity of good grades of Uppers notwithstanding the estimated carry-over of 300,000,000 pounds. The approximate available supply, figuring the new crop at 550,000 bales and allowing for the carry-over as above, is about 1,000,000 bales.

DRILLS, SHEETINGS AND OSNABURGS

Prices on most items are nominal. As the prices moved up there was a very marked increase in demand until they reached a level where they were considered abnormal even for this market. There has been a feeling that the increased prices out ran the market rise in the crude product.

BURLAPS

Official forecast issued about the middle of the month stated that 4,000,000 bales was the estimated yield of jute compared with between 7,500,000 and 8,000,000 bales last year and about those figures for an average of the previous four years. Sales of Burlap have been very active at advanced prices.

Current quotations on the various fabrics used in the rubber industry are as follows:

TIRE FABRICS (Square Woven)			
17¼-ounce Sea Island, combed,	lb.	.85 @	.90
17¼-ounce Egyptian uppers, combed,	lb.	.75 @	.80
17¼-ounce Egyptian uppers, carded	lb.	.65 @	.70
17¼-ounce Sakellarides, combed	lb.	.80 @	.90
17¼-ounce Sakellarides, carded,	lb.	.60 @	.65
17¼-ounce Peelers, combed,	lb.	.75 @	.80
17¼-ounce Peelers, carded,	lb.	.56 @	.60
CORD FABRICS			
Combed Sakellarides	lb.	.95 @	1.00
Carded Sakellarides	lb.	.85 @	.90
Combed Peeler	lb.	.82 @	—
Carded Peeler	lb.	.61 @	.65
Carded Arizona	lb.	.80 @	.90
Combed Egyptian uppers	lb.	.85 @	—
Carded Egyptian uppers	lb.	.80 @	—
DUCKS			
Belting (pound basis)	lb.	.36 @	—
Hose (pound basis)	lb.	.36 @	—
*Enameling	lb.	.37 @	—
Shoe Ducks	lb.	.42 @	—
Single filling	yd.	.17 @	—
Double filling	yd.	.18 @	—
*Price varies according to width.			
DRILLS			
37-inch 3.25-yard	yd.	.09½ @	—
37-inch 2.75-yard	yd.	.11½ @	.12½
37-inch 3.00-yard	yd.	.09 @	.10
37-inch 3.50-yard	yd.	.09½ @	—
37-inch 3.95-yard	yd.	.09½ @	—
OSNABURGS			
30-inch 7-ounce		.12½ @	—
40-inch 7-ounce		.14½ @	—
SHEETINGS			
40-inch 2.50-yard	yd.	.13¼ @	—
40-inch 285-yard	yd.	.12½ @	—
40-inch 3.15-yard	yd.	.13¼ @	—
40-inch 3.60-yard	yd.	.12 @	—
40-inch 3.75-yard	yd.	.10¾ @	—
40-inch 4.25-yard	yd.	.09 @	—
BURLAPS (Carload Lots)			
7 -ounce 40-inch	yd.	3.50 @	3.55
7½-ounce 40-inch		3.50 @	3.60
7¼-ounce 45-inch		3.60 @	3.65
10 -ounce 40-inch		3.65 @	—
10 -ounce 36-inch		4.35 @	—
8 -ounce 40-inch		3.65 @	—
10 -ounce 45-inch		5.60 @	—
10½-ounce 40-inch		4.75 @	—
(Practically all prices nominal)			

Crude Rubber

NEW YORK, SEPTEMBER 19, 1921

The encouraging feature of the past fortnight in the crude rubber market has been a decided increase in the interest shown by the medium-sized factories in all parts of the country. This has not yet been appreciably reflected in market prices, as it is stated that manufacturers can obtain their requirements at prices even more favorable than market quotations, if they do not ask for extreme terms. Ribbed smoked sheets have moved up only ¾ cent per pound during the fortnight and are now quoted at 14¾ cents, but the tendency is upward, and some shrewd market observers believe that prices will now be sustained.

The feeling exists that any material price change will be upward, and that ribbed smoked sheets will be back to 20 cents a pound at least before very long. It is not thought, however, that prices will go above 20 cents for some time to come.

The stronger undertone in this market is also reflected in the cables received from the European markets, where a more hopeful feeling prevails than for many months past.

Industrial conditions in England, France and Germany are reported as much improved with the result that more crude rubber is entering into consumption in those countries. Stocks on the London market on September 7 were 73,081 tons against 32,143 tons on the corresponding date last year. That rubber manufacturing is progressing in Germany is evidenced by the fact that England shipped 3,567 tons to Germany during the first seven months of 1921. Sterling exchange has remained firm during the fortnight being quoted from 3.70 to 3.72¼.

At the moment the interest may be said to be principally in spot and nearby rubber, although futures received considerable attention earlier in the month. There was little buying beyond the January-June position.

Latex and ribs are now quoted on one price level. It will be recalled that these two grades for some time past have been approaching each other in price, although the Latex grades have ordinarily been held as much as 2 cents higher than ribs. A shortage is reported in the Blankets, No. 4 Amber and Grand Centrals which are being held at a premium.

A shortage is being felt in some grades of Paras which are coming into the market in constantly decreasing quantities. Up-river Coarse is now quoted up to within a quarter of a cent a pound of Caucho Ball, although it ordinarily sells at least two cents below. Fine is quoted

Current qutations on standard grades are as follows:

Plantations			
Ribbed Smoked sheets, spot	.14½	@	.14¾
October	.14½	@	.14¾
Oct.-Dec.	.15	@	.15¼
Jan.-Mar.	.15½	@	.15¾
Jan.-June	.16½	@	.16¾
April-June	.17	@	.17¼
Smoked sheet plain, spot	.11	@	.11½
First latex pale crepe, spot	.14½	@	.14¾
October latex	.14½	@	.14¾
Oct.-Dec. latex	.15½	@	.15¾
Amber crepe, No. 1	.13	@	.13¼
Amber crepe, No. 2	.12	@	.12¼
Amber crepe, No. 3	.11	@	.11½
Grand Central crepe	.11¼	@	.11½
Clean thin brown crepe	.12	@	.12¼
Light clean thin brown	.12½	@	.12¾
Rolled brown crepe	.11¼	@	.11½
Paras			
Madeira Fine	.22½	@	.23
Acre fine	.20	½	.20½
Up-river fine	.19½	@	.20½
Up-river medium	.16½	@	.17
Up-river coarse	.10½	@	.10¾
Islands fine	.17¾	@	.18
Islands coarse	.09½	@	.10
Caucho ball	.10¾	@	.11
Cameta	.08¾	@	.09
Xingu Ball	.09¾	@	.10¼
Tapajos fine, spot	.16½	@	.17
Pontianac			
Prime	.10	@	.10½
Bangermassin	.07	@	.07¼
Palembang	.06½	@	.06¾
Gutta Siak	.15	@	.15¼
Balata			
Panama Block	.28	@	.30
Surinam Sheets	.67	@	.70
Columbian Block	.38	@	.40
Cindad	.52	@	.54

Scrap Rubber

NEW YORK, SEPTEMBER 20, 1921

The scrap rubber market still remains inactive with little general demand from the reclaiming industry. Prices in general remain unchanged. Boots and shoes have shown some activity and prices have moved up a quarter of a cent to 3½ cents

Quotations are nominally as follows:

Auto tire peelings	.01⅛	@	.01⅜
Standard White auto	.01⅛	@	.01⅜
Mixed auto	.00⅝	@	.00¾
Bicycle tires	.00½	@	.00⅝
Solid truck tires	.01	@	.01⅛
Boots and Shoes	.03¼	@	.03½
Aretica, trimmed	.01⅝	@	.01¾
Aretica, untrimmed	.01⅛	@	.01¼
Inner tubes, No. 1	.04	@	.04½
Inner tubes, compounded	.02	@	.02¼
Battery jars, black compounded	Nominal		
Batteryjars, No. 1 bright fracture	"		
Inner tubes, red	.02	@	.02⅜
Heels and pads	Nominal		
Black mixed	.00¼	@	—
Garden hose	.00½	@	—
Air brake hose	.00½	@	—
Red packing	.01⅛	@	.01¾
Red mixed rubber	.02	@	—
White mixed rubber	.01¾	@	—

Reclaimed Rubber

NEW YORK, SEPTEMBER 20, 1921

The reclaimed rubber industry remains in the same quiet condition as for some months past with prices practically unchanged.

Quotations are nominally as follows:

Standard Reclaims			
Floating	$.13	@	$.14
Friction	.13	@	.14
Boots and Shoes	.10	@	.10½
Boots and Shoes (washed	.13	@	.14
Mechanical	.08	@	.10
Hose	.10½	@	.11½
Tires, truck	.08	@	.09
Tires, auto	.09	@	.10
White	.13	@	.14

New Incorporations

NEW YORK

Broadfield Toy Co., Inc., to manufacture toy airplanes. $20,000. I. B. Billings, president and treasurer; T. B. Lavelle, vice president and secretary. Principal office, 112 Grove street, Hempstead, Long Island, N. Y. Carmen Tire and Rubber Co., Inc., to manufacture tires, etc. $50,000. Incorporators: W. A. Marsh, 511 W. 130th street; W. U. Callahan, 106 Central Park West; both in New York City. F. G. Marsh, 229 Franklin avenue, Garden City, Long Island, N. Y.

Burnett-Webb Tire Corp., Syracuse, to manufacture tires. $10,000.

Porteous Products Corp., Manhattan, to manufacture rubber goods. $25,000. A. G. Porteous, F. L. Woodward, W. R. Chamberlain; attorney, H. C. Knoeppel, 5 Beekman St.

Lind-Hendrickson Co., Inc., to manufacture and sell elastic exercisers. $10,000. Incorporators: A. A. & B. Hendrickson, both of 14 Maple avenue, Hackensack, N. J.; V. J. Lind, 228 Flatbush avenue, Brooklyn, New York. Principal office, 63 Dey street, New York.

M. F. & R. Tire Co., Inc., to deal in tires. $500. Incorporators: L. Bleich, F. C. McGeechan, W. P. Riley—all of 2 Rector street, New York.

Memorial Highway Tire Corporation. $25,000. W. C. Dargen, G. C. Riley, A. R. Hanison—all of 14 Ellicott square, Buffalo, N. Y. Principal office, Buffalo, N. Y.

O'Connor Rubber Co., Inc., to buy and sell rubber. $2,000. I. D. Fitzgerald, president; R. W. Fitzgerald, secretary and treasurer; both of 348 East 78th street; H. J. O'Connor, vice president, 1517 Avenue A—both in New York. Principal office, 38 Bond street, New York.

Factory Tire Outlet Corp., Brooklyn, to manufacture rubber and gutta percha goods. $250,000. Incorporator: H. Pivnick, 729 Saratoga avenue, Brooklyn.

Brennan-Busch, Rochester, to manufacture auto tires. $5,000. J. M. Brennan, J. McSweeney, F. W. Busch; attorneys, O'Brien & McSweeney, Rochester.

DELAWARE

American Rubber Preserver Corporation. Manufacture rubber, rubber tires, rubber cement and other rubber goods.$500,000. Incorporators: T. L. Croteau, C. H. Blaske, S. E. Dill, all of Wilmington. Delaware agent, (Corporation Trust Company of America).

Howe Rubber Corp. $4,000,000. Incorporator: F. S. Moore, 132 West 42d St.

Benjamin Products Corp., Wilmington, to deal in rubber and gutta percha, and cultivating rubber trees. $1,000,000.

Ajax Tire Co. of Nashville, to manufacture tires. $2,000. Attorney, Corporation Trust Co. of Delaware, Wilmington.

Automotive Supply Manufacturing Co. $150,000. Attorney, Corporation Trust Co. of America, Wilmington.

ILLINOIS

Peerless Safety Can and Device Manufacturing Co., Inc., to manufacture, buy and sell automobile accessories, etc. $150,000. Incorporators: B. F. Allmutt and R. White, 2930 Geddings Street, Chicago; R. Abram, Riverside, Ill. Principal office, 129 South Green St., Chicago, Ill.

MASSACHUSETTS

Columbi Tire Corporation, to manufacture and deal in automobile tires, etc. $100,000. Incorporators: U. Columbi, 2 Lathrop Place, Boston; F. Rettine, 218 East Eagle street, East Boston; R. Zenoui, 2 Spruce street, Fitchburg—all in Massachusetts.

MAINE

Dirigo Motor Co., Bangor, to manufacture and deal in motor vehicles, bicycles, tricycles, wagons, carriages, etc. and to repair same. $100,000.

OHIO

The Quality Rubber Company, Ashland $50,000. Incorporators: W. S. Kurtz, F. W. Saltsman, C. E. Kurtz, L. A. Swineford, Samuel Kurtz.

The Income Rubber Company, Columbus. $1,000. Incorporators: C. R. Spahn, M. S. Osborn, B. King, A. K. Nier.

NAME CHANGES

Arrowstar Tire and Supply Co., Manhattan, to Arrowstar Auto Radiator and Lamp Co.

Akron-Overland Tire Co., to Ranger Rubber Co.

CAPITAL INCREASE

Empire Rubber Producers Corp., Philadelphia, Pa. $250,000 to $530,000.

Bergougnan Rubber Corp., Trenton, N. J., $2,500,000 to 4,000,000.

The Warren Rubber Co., Warren, N. J. from $2,500,000 to $4,000,000.

REDUCTION OF SHARES

Burnet Webb Tire Corp., Syracuse, 1,000 to 100.

Akron Stock Prices

The more strongly entrenched, financially, of the rubber companies in the Akron mnaufacturing district are attracting the attention of investors. This is shown by the strong tone being maintained by the best of these stock issues.

Firestone 6 per cent preferred is being held for 90, the closest to par in many, many months. The second preferred of that company which bears 7 per cent interest is being offered at 73. Goodrich preferred is attracting bids of 76, while 80 is asked. Bids of 91 are recorded for Goodrich five-year notes. Goodyear 8's, the new bond issue, is being offered at 102¼. Miller preferred is held at 74 and General preferred at 85.

The market has been fairly active at times, but investors are absorbing preferred issues for the most part and brokers do not anticipate extensive dealings in common shares until the return to normaley is more apparent to the average man.

Following are quotations of the Akron market on September 17:

	Bid	Asked
Amer. R. & T. com.	30	35
Amer. R. & T. pfd.	..	80
Amazon Rubber	..	20
Firestone T. & R. com.	50	60
do 6 pct. pfd.	82	90
do 7 pct. pfd.	71	73
General T. & R. com.	175	200
do 7 pct. pfd.	75	85
B. F. Goodrich com.	31	32
do 7 pct. pfd.	76	80
..do 5 yr. 7 pct. notes	91	92
Goodyear T. & R. com.	10½	11
do 7 pct. pfd.	27¾	28½
Goodyear's 8's	102	102½
India Rubber com.	65	75
do 8 pct. pfd.	55	70
Mason T. & R. com.	9	9½
do 7 pct. pfd.	45	49
Marathon T. & R. com.	2¾	3
Miller Rubber com.	46	58
do 8 pct. pfd.	70	74
Mohawk Rubber	70	80
Portage Rubber com.	..	2
do 7 pct. pfd.	..	2
Republic Rubber com.	17c	.25c
do 7pct. pfd.	9½	10½
do 8 pct. pfd.	..	2½
Rubber Products	35	60
Star Rubber com.	..	100
do 8 pct. pfd.	..	100
Swinehart T & R. com.	..	40
do 7pct. pfd.	..	70
Phoenix Rubber com.	..	15
do pfd.	..	90
Standard Tire com.	..	100
do pfd	..	90

Chemicals and Compounding Materials

THE GENERAL MARKET—NEW YORK, SEPTEMBER 19—The early weeks of September showed in an encouraging way the better tone that was predicted. There was a decided improvement in demand for most materials and in sufficiently large lots to make practically all factors confident that the market was on the up turn. The trend of the market now seems determined and there should continue a steady improvement. The feeling of uncertainty that prevailed during the summer months on account of foreign competition has given way to healthy optimism. Besides the better tone noted in the domestic demand there has been sufficient inquiries in export to further strengthen market ideas. The general feeling is that liquidation is through. All that is wanted is continued demand from the various industries.

ACCELERATORS

Organic

Aldehyde ammonia, crystals	lb.	$ .95 @	1.00
Aniline oil, bulk basis	lb.	.19 @	—
Excellerex	lb.	.55 @	.65
Formaldehyde-aniline	lb.	.55 @	.60
Hexamethylene-tetramine (powdered)	lb.	.08 @	—
Paraphenylene-diamine	lb.	— @	—
Thiocarbanilid	lb.	.45 @	.65
Vulcocene	lb.	.35 @	..

Inorganic

Lead, dry red, bbls.	lb.	.10 @	—
Lead, sublimed white	lb.	.07¼ @	.07½
white, basic carbonate	lb.	.07½ @	.08
Litharge, commercial, bbls.	lb.	.07½ @	.07¾
Lime, hydrated	lb.	.03 @	—
Magnesia, calcined, extra light	lb.	.50 @	—
heavy	lb.	.06 @	.07
Magnesite, powdered	ton	50.00 @	65.00

COLORS

Blacks

Bone, powdered	lb.	.06½ @	.08½
Carbon black	lb.	.10½ @	.20
Drop	lb.	.07½ @	.16
Ivory	lb.	.15 @	.45
Lampblack	lb.	.17 @	.45

Blues

Prussian	lb.	.50 @	.60
Ultramarine	lb.	.10 @	.35
Cobalt	lb.	.25 @	.30
Rubber maker's blue	lb.	3.50 @	..

Browns

Iron oxide	lb.	.04 @	.06
Sienna, Italian, raw and burnt	lb.	.06 @	.14½
Umber, Turkey, raw and burnt	lb.	.03¾ @	.04¾

Greens

Chrome, light, c. p.	lb.	.32 @	.34
medium	lb.	.34 @	.39
dark	lb.	.43 @	.47
oxide	lb.	.55 @	.65

Reds

Antimony, crimson	lb.	.40 @	.51
golden	lb.	.25 @	.30
red	lb.	.25 @	.28
Indian, pure	lb.	.12 @	.17
Oxide, copperas, pure	lb.	.10 @	.14
reduced	lb.	.11½ @	.12½
Para toner	100 lb.	1.40 @	—
Toluidine toner	lb.	2.75 @	3.10
Tuscan	lb.	.17½ @	.30
Venetian	lb.	.03½ @	.06½
Vermillion, English, quicksilver	lb.	.80 @	.85
domestic	lb.	.25 @	.30

Whites

Albalith	lb.	.06 @	.06¼
Aluminum flake	ton	25.00 @	35.00
Lithopone, Beckton white	lb.	.06 @	.06½
Lithopone, domestic (f. c. tory)	lb.	.06 @	.06½
Zinc oxide, American Horse Head Special	lb.	.08 @	.08½
XX red	lb.	.07½ @	.08
Zinc oxide, French process, White seal	lb.	.11 @	.11¼
Green seal	lb.	.09¾ @	.10¼
Red seal	lb.	.08¾ @	.09¼

Yellows

Cadmium sulphide	lb.	1.10 @	1.35
Chrome, light, c. p.	lb.	.20 @	—
dark	lb.	.20 @	—
medium	lb.	.20 @	—
Ocher, French	lb.	.03¼ @	.04
domestic strong	lb.	.03 @	.05
Zinc chromate	lb.	.37 @	—

COMPOUNDING INGREDIENTS

Aluminum flake	ton	25.00 @	35.00
hydrate	ton	22.00 @	25.00
Ammonium carbonate, powdered	lb.	.06 @	.09
Barium dust	ton	100.00 @	—
Barytes, Southern off-color, f.o.b. mills	ton	15.00 @	17.00
Western, prime white, f.o.b. mills	ton	23.00 @	—
Basofor	lb.	.04½ @	—
Beta-naphtol, technical	lb.	.33 @	—
Blanc fixe, dry, f.o.b. works	lb.	.03½ @	—
Chalk, precipitated, extra light	lb.	.03½ @	.04¼
heavy	lb.	.02½ @	.03¼
Clay, China, domestic	ton	7.50 @	9.00
imported	ton	16.00 @	24.00
Dixie	ton	22.00 @	35.00
Blue Ridge	ton	22.00 @	35.00
Fuller's Earth, powdered	ton	22.00 @	25.00
Fossil flour	ton	60.00 @	..
Glues, extra white	lb.	.30 @	.40
medium white	lb.	.24 @	.30
cabinet	lb.	.20 @	.35
cabinet low grade	lb.	.16 @	.18
common bone	lb.	.10 @	.16
Graphite flake, bbls.	lb.	.14 @	.20
powdered	lb.	.04 @	.10
Ground glass, fine	lb.	.03½ @	.04
Infusorial earth, powdered	ton	60.00 @	—
bolted	ton	65.00 @	—
Liquid rubber	lb.	.15 @	—
Rotten Stone	lb.	.02½ @	.04½
Silica (aluminum)	ton	25.00 @	30.00
Soapstone, powdered	ton	15.00 @	20.00
Starch, powdered corn	cwt.	2.33 @	—
Talc, domestic	ton	18.00 @	20.00
French	ton	22.50 @	30.00
French, high grade	ton	40.00 @	45.00
Italian	ton	40.00 @	45.00
Terra Alba, American No. 1	cwt.	1.85 @	2.00
American No. 2	cwt.	1.25 @	..
Tripoli	ton	25.00 @	—
Whiting, domestic	cwt.	.75 @	.80
Quaker	ton	13.00 @	15.00
English cliffstone	cwt.	1.70 @	1.90
glider's bolted	cwt.	1.20 @	1.35
Paris white American	ton	35.00 @	—
Zinc Oxide— 5 per cent leaded		.07¼ @	.07¾
10 per cent lead sulphate	lb.	.07 @	.07½
20 per cent lead sulphate	lb.	.07 @	.07½
35 per cent lead sulphate	lb.	.07 @	.07½

MINERAL RUBBER

Gilsonite	ton	70.00 @	—
Genasco (c. l. factory)	ton	50.00 @	—
(l. c. l. factory)	ton	52.00 @	—
Hard hydrocarbon	ton	35.00 @	45.00
Soft hydrocarbon	ton	35.00 @	40.00
M. R. X.	ton	— @	—
Pioneer (c.l. factory	ton	46.00 @	—
(l.c.l. factory)	ton	48.00 @	—
Raven M. R.	ton	— @	—
320 M. P. hydrocarbon (c. l. factory)	ton	50.00 @	55.00
(l. c. l. factory)	ton	57.50 @	—
300/310 M. P. hydrocarbon (c. l. factory)	ton	40.00 @	—
(l. c. l. factory	ton	45.00 @	—
Synpro, granulated, M. R. (factory)	ton	69.50 @	75.00

SOFTENERS

Acids

Acetic, 28 per cent	cwt.	2.50 @	3.00
Carbolic (phenol)	lb.	.09½ @	.16
Cresylic, 97 to 99 p. c. pale	gal.	.65 @	.70
Muriatic, 20 degrees	cwt.	1.40 @	2.00
Nitric, 36 degrees	cwt.	5.50 @	6.50
Sulphuric, 66 degrees	ton	18.00 @	20.00
60 degrees, bulk	ton	11.00 @	12.00
Tartaric, crystals	lb.	.35 @	—

Alkalies

Caustic soda, 76 p.c.	cwt.	4.00 @	4.15
Soda ash, 58 p. c.	cwt.	2.45 @	2.50

Oils

Castor, No. 3, bbls.	lb.	.09½ @	—
Corn, crude, bbls.	lb.	.08½ @	.09
refined	lb.	.10 @	.10½
Chinawood, bbls.	lb.	.12½ @	.16
Cottonseed,	lb.	.08½ @	.09
Glycerine, c.p. drums	lb.	.14½ @	.15
Linseed, carload spot	gal.	.80 @	—
bbls.	gal.	.78 @	—
Palm, Niger	lb.	.06¼ @	.06½
Lagos	lb.	.07½ @	.07¾
Peanut, domestic crude	lb.	.07¼ @	.07½
Pine, steam distilled, over 930° sp. gr.	gal.	1.20 @	—
Rapeseed, refined	gal.	.90 @	—
blown	gal.	.95 @	—
Rosin, first rectified	gal.	.37 @	—
second rectified	gal.	.39 @	—
Tar, commercial	gal.	.31½ @	—
Soya Bean, crude, bbls.	lb.	.08¾ @	—

Resins and Pitches

Cantella gum	lb.	.50 @	..
Cumar resin	lb.	.09 @	.13
Tar, retort	bbl.	11.75 @	12.50
kiln burned	bbl.	11.50 @	12.00
Pitch, Burgundy	lb.	.05 @	.06
coal tar	ton	20.00 @	—
rosin	bbl.	5.85 @	—
Rosin, grade B. ex-yard	bbl.	5.35 @	—
grade K	bbl.	5.70 @	—
Shellac, fine orange	lb.	.90 @	—

Solvents

Acetone, drums, c.p.	lb.	.12½ @	.13
Alcohol, denatured, No. 1	gal.	.38 @	.40
Methyl, 95 per cent, drums	gal.	.60 @	.63
Ethyl, 190 proof, bbls.	gal.	4.70 @	4.80
Benzol, 90 per cent	lb.	.25 @	.38
pure	lb.	.27 @	.40
Carbon bisulphide,	lb.	.06 @	.07½
tetrachloride	lb.	.10 @	.12
Dimethylaniline	lb.	.45 @	.54
Naptha, motor gasoline, steel bbls.	gal.	.24 @	—
68 to 70 degrees	gal.	— @	—
73 to 76 degrees	gal.	— @	—
Taluol, pure drums	gal.	.28 @	.30
Turpentine, spirits	gal.	.62½ @	—
wood	gal.	.59½ @	—
Xylol, pure	gal.	.40 @	.43
commercial	gal.	.28 @	.35

Waxes

Beeswax white, pure	lb.	.38 @	.41
Carnauba, No. 1	lb.	.46 @	.47
Ceresin, white	lb.	.09 @	.10
Bayberry	lb.	.20 @	.21
Montan, crude	lb.	.07 @	—
Ozokerite, hard, pure	lb.	.30 @	.31
Paraffin,	lb.	.03½ @	.08
Petrolatum, amber, bbls.	lb.	.05 @	.05½
dark amber,	lb.	.04½ @	—

SUBSTITUTES

Black	lb.	.08 @	.14
White	lb.	.09 @	.16
Brown	lb.	.11 @	.15
Brown factice	lb.	.07 @	.15
White factice	lb.	.08½ @	.17
Paragol, soft and medium	cwt.	6.81 @	—
hard	cwt.	6.81 @	—

VULCANIZING INGREDIENTS

Lead, black hyposulphite (black hypo)	lb.	.40 @	—
Orange mineral, domestic	lb.	.11¾ @	.13½
Sulphur chloride (jugs)	lb.	.20 @	—
Sulphur flour Brooklyn brand (c.l.)	cwt.	— @	—
Brooklyn brand (l.c.l.)	cwt.	— @	—
Bergenport (c.l.)	cwt.	2.55 @	—
pure soft	cwt.	2.30 @	—
superfine (c.l.)	cwt.	— @	—

Caustic Soda—Business very good at market levels with more sizeable transactions. There are no large accumulations of stock and the market is well maintained. Most of the calls are on domestic account with sellers holding to $4.00.

Litharge—There is a steady consuming demand for this product and manufacturers quote 7¼ cents on carload lots while smaller quantities bring 7½ cents.

Linseed Oil—At one period during the second week of the month 80 cents on contracts was asked compared with 77 cents at the close and 75 cents the previous week. Light stocks prevail in consuming industries and business beyond September was not heard of.

Soya Bean Oil—A little increase in the demand would increase prices in this material. The supply is light and handlers are very optimistic.

Soda Ash—Domestic consumption has improved greatly and orders were received for large lots; some as high as 1,000 tons. Some competition with imported ash was felt, not very serious competition but enough to lead to a transient weakness. Light ash in barrels on spot was firm at $2.45 @ $2.50.

Xylol—The market has been well maintained with supplies in light volume. Prices remained at the old level of pure 40 @ 43 cents per gallon and commercial 28 @ 35 cents.

China Wood Oil—Factors in this market look for higher prices on account of the scarcity of the oil in the eastern distributing centers. The protracted draught and political disturbances in China are said to be the cause of the lessening supply available.

Phenol—The demand was along quiet lines with occasional fair sized orders. Holders of water white goods refined to shade 9½ cents.

Carbon Tetrachloride—Inquiry for this item has been broader than it has been for some time and producers report a fairly good business, although it is principally confined to small lots. Prices remain at the former level.

Aniline Oil—Report is that liberal quantities of the product are being offered. Quotations range from 18 cents to 19 cents.

Lithopone—A good demand for both the domestic and imported article is reported. Sales have been made at 5¾ to 6 cents.

Whiting—Stocks are moving steadily in accordance with a good demand. Good business is being done in English cliffstone. Domestic manufacturers.

American Rubber Patents

ISSUED AUGUST 23, 1921

1,388,255—To William Edward Hardeman, Birmingham, England, assignor to the Dunlop Tire & Rubber Corporation of America, Buffalo, N. Y. Tire-press.

1,388,275—To Arthur B. Low, Denver, Colo. Tire-gage.

1,388,326—To Morris J. Chaikin, Detroit, Mich. Tire-pump.

1,388,382—To Fred A. Schwartz, Brooklyn, N. Y. Mold for pneumatic tire tubes.

1,388,435—To Karl B. Kilborn, Akron, Ohio, assignor to the Goodyear Tire & Rubber Co., Akron, Ohio. Method of and apparatus for removing pneumatic tires from cores.

1,388,447—To Walter A. Black, Perry, Iowa. Tire-core.

1,388,453—To Samuel Cleland Davidson, Belfast, Ireland. Treatment of raw rubber when freshly coagulated from the latex.

1,388,597—To Harry N. Pappas, Okmulgee, Okla. Protecting armor for tires.

1,388,747—To Chas. F. Ofensend, Akron, Ohio, assignor to the Miller Rubber Co., Akron, Ohio. Method of building cord tires.

1,388,748—To Alden C. Olander, Billings, Mont. Tire-protector.

1,388,762—To Ralph E. Riley, Akron, Ohio, assignor to the Miller Rubber Co., Akron, Ohio. Manufacture of rubber bathing caps.

1,388,773—To Domenico, Simone, Washington, D. C. Rubber-heel.

Frank Lahey's New Location

Frank T. Lahey, for many years Akron manager for the crude rubber importing firm of Poel & Kelly, 347 Madison Ave., New York, has moved his offices from the Second National Building, Akron, to 8 South Broadway, where he has a ground floor location. From his long period of service for his firm in the rubber city, Mr. Lahey is generally regarded as the dean of the Akron crude rubber dealers and representatives.

Carew & Sheehan, New Rubber Firm

M. M. Carew and A. E. Sheehan announce that they have formed a partnership to conduct a crude rubber brokerage business under the firm name of Carew & Sheehan, and that they have opened an office at 61 Whitehall street, New York. Both Mr. Carew and Mr. Sheehan were with the J. Frank Dunbar Co. recently. Mr. Sheehan was formerly with Bennett Day & Co.

Stedman Back from Abroad

Arthur W. Stedman, crude rubber broker of 68 Broad street, New York, is back at his desk after a month's vacation in England. While abroad he was the guest of Frederick Toppin, first vice-president of the International Mercantile Marine. Mr. Stedman was very much impressed with the optimistic feeling that prevailed among the business executives he met abroad.

He is an enthusiastic golfer and as a member of the Seniors' Golf Association attended the annual tournament at the Apawamis Club, Rye, N. Y., before getting down to work.

Kelly to Close Wooster Plant

(Special Akron Correspondence)

Reports from Wooster, Ohio, tell of preparations to close the plant of the Kelly-Springfield Tire Co. there. All but fifty of the employes have been laid off and arrangements are being made to move the machinery to the new Kelly-Springfield plant at Cumberland, Md.

Keystone Plant to be Rebuilt

The plant of the Keystone Rubber Mfg. Co's plant at Erie, Pa., which was destroyed by fire several monthes ago, is to be rebuilt. The new plant will be 123 x 203 feet in size, three stories high and of brick and steel construction. It will cost $50,000.

New Quarters for Quaker City

The Quaker City Rubber Co., Philadelphia, Pa., will move into their new Quaker Building, 624-628 Market Street about November 1. They have been located on this street for more than twenty-five years, and their new building is directly across the street from their present quarters 629 Market Street.

Well-appointed offices for the executives of the company and for the clerical force as well as ample space for shipping and receiving have been provided. Large plate glass windows with ample depth for display purposes are on the street floor. The exterior is of Indiana limestone and tapestry brick. High speed electric elevators and a vacuum steam heating system, thermostatically controlled, have been installed.

Beside making the well known Quaker tires and tubes, they are widely known as mechanical rubber goods manufacturers, their lines including, Daniel's Patent P. P. P. Rod Packing, Ebonite Sheet Packing, Ironsides rubber belting for power transmission and conveying and rubber hose for all purposes. Charles A. Daniel is president of the company.

They extend a cordial invitation to their many customers and friends to visit them in their new building.

Wuchter General Manager of Nebraska

In the article in the September 10 issue of THE RUBBER AGE in regard to William W. Wuchter, the new president of the Mid-West Rubber Manufacturers' Association, it should have been added that he organized the Nebraska Tire & Rubber Co., at Omaha, Neb., about four years ago, of which company he is treasurer and general manager.

Toeplitz to Visit Europe

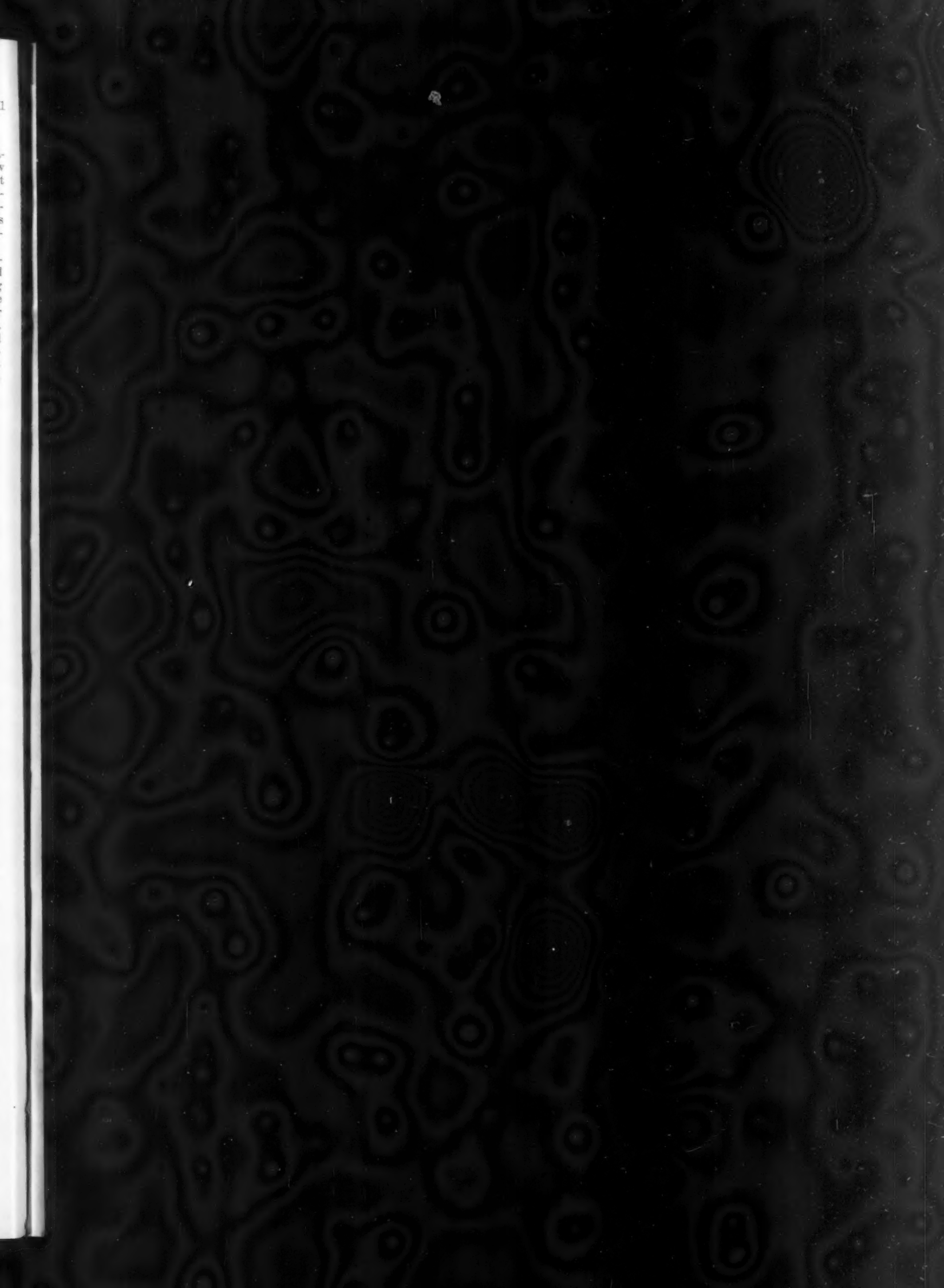
Richard H. Toeplitz, vice president of the Crude Rubber Brokerage Co., 99 Water street, New York, sailed on the steamship *New Amsterdam* on September 17 for a European tour. He expects to visit the rubber centers in England and Holland returning in six weeks.

Excel Rubber Rents Plant

(Special Akron Correspondence)

The Excel Rubber Co. of Wadsworth rented the plant of the Biltwell Tire and Rubber Co. at Barberton recently for use while repairs were being made at the Wadsworth factory. The Excel officials announce that orders were so heavy that they could not afford to stop production during the time repairs were made.

New York Stock Prices

Following are the New York Stock Exchange quotations on the various rubber stocks listed for September 20:

	Bid	Asked
Ajax Rubber Co.	22½	22¾
Fisk Rubber Co.	10	10½
B. F. Goodrich Co.	30¾	31¾
Kelly-Springfield Tire Co.	40½	41
Keystone Tire Co.	11¾	11½
Lee Rubber & Tire Co.	26	26½
U. S. Rubber Co.	47⅜	47½
do 1st. pfd.	84½	85½